

PERSONAL COMPUTING

FEBRUARY 1982
\$2.00

A Hayden Publication



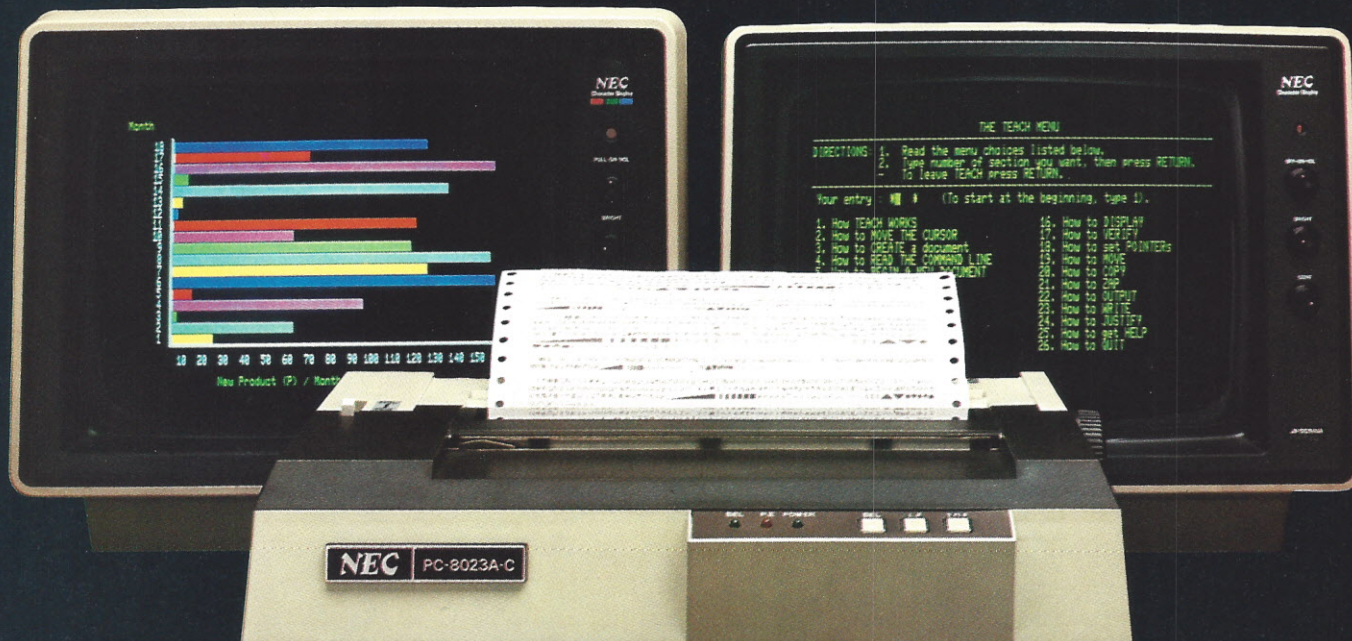
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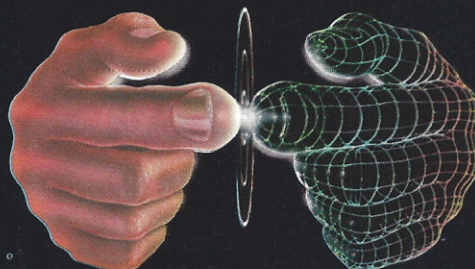


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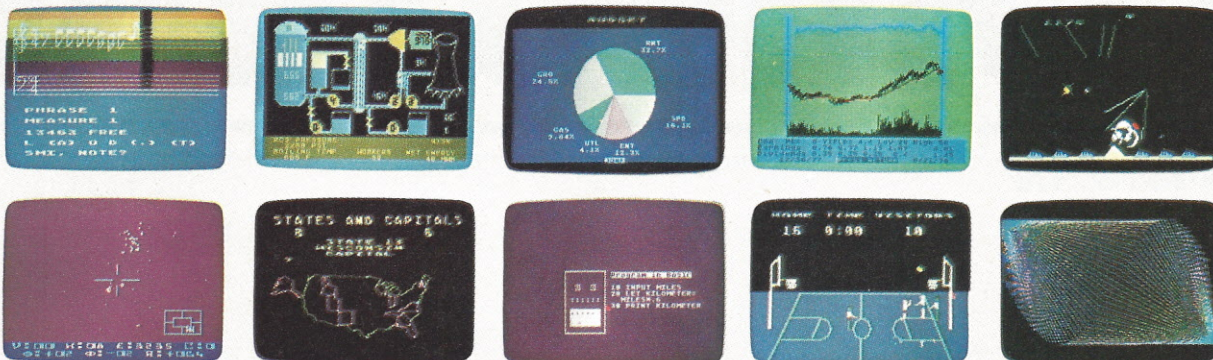
NEC

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Personal Computer Division**
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CIRCLE 1

THE GRAPHIC DIFFERENCE

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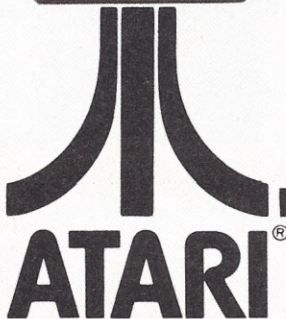


Sound. An ATARI computer has four sound generators, or voices, activated by a separate microchip. This leaves the principal microprocessor chips free to perform other tasks. And you can take full advantage of this capability which is designed for easy programming.

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*ATARI 800™ computer only.

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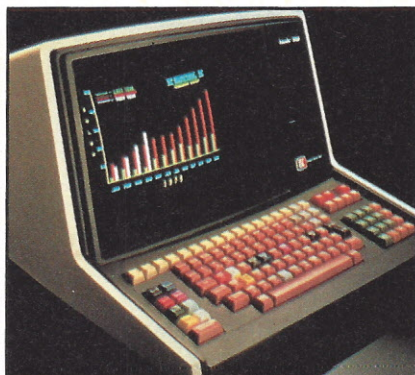
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BEHIND THE COVER

There's no need to hire a warm body to ensure that your household runs smoothly. Personal computers are becoming the perfect servants. . .and they don't request TVs for their rooms.



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BY ALAN RADDING Personal computers are being used to shed light on cloudy weather data and to help solve many weather-influenced problems—such as air pollution.

55 TECHNOLOGY SHOCK IS MANAGEABLE

BY SUSAN FOSTER When computing, frustration can set up blocks that can slow you down. This need not be the case, and the experts tell us why.

58 THE EFFICIENT NEW SERVANT COMES HOME

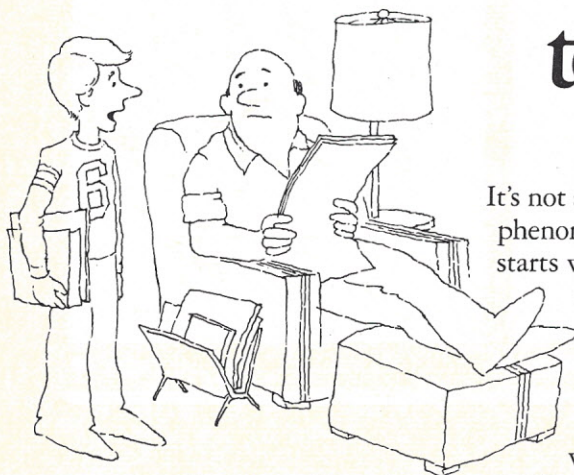
BY KEN MCLAMB Personal computers in the home are serving their masters by taking over dozens of manual functions that provide safety and comfort.

65 A PERSONAL COMPUTING SPECIAL REPORT: MASS STORAGE MADE SIMPLE

BY DAVID JAMES Memories are made of more than starry nights and moonlit ponds. In fact, memory, or mass storage in this case, is made more of a computer's capacity to transfer data from one source to another. Which of these sources is for you?

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"Dad, can I use the IBM computer tonight?"



It's not an unusual phenomenon. It starts when your son asks to borrow a tie. Or when your daughter wants to

use your metal racquet. Sometimes you let them. Often you don't. But when they start asking to use your IBM Personal Computer, it's better to say yes.

Because learning about computers is a subject your kids can study and enjoy at home.

It's also a fact that the IBM Personal Computer can be as useful in your home as it is in your office. To help plan the family budget, for instance. Or to compute anything from interest paid to calories consumed. You can even tap directly into the Dow Jones data bank with your telephone and an inexpensive adapter.

But as surely as an IBM Personal Computer can help you, it can also help your children. Because just by playing games or drawing

colorful graphics, your son or daughter will discover what makes a computer tick — and what it can do. They can take the same word processing program you use to create business reports to write and edit book reports (and learn how to type in the process). Your kids might even get so "computer smart," they'll start writing their own programs in BASIC or Pascal.

Ultimately, an IBM Personal Computer can be one of the best investments you make in your family's future. And one of the least expensive. Starting at less than \$1,600* there's a system that, with the addition of one simple device, hooks up to your home TV and uses your audio cassette recorder.

To introduce your family to the IBM Personal Computer, visit any ComputerLand® store or Sears Business Systems Center. Or see it all at one of our IBM Product Centers. (The IBM Data Processing Division will serve business customers who want to purchase in quantity.)

And remember. When your kids ask to use your IBM Personal Computer, let them. But just make sure you can get it back. After all, your son's still wearing that tie.

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The IBM Personal Computer and me.



*This price applies to IBM Product Centers. Prices may vary at other stores.

For the IBM Personal Computer dealer nearest you, call (800) 447-4700. In Illinois, (800) 322-4400. In Alaska or Hawaii, (800) 447-0890.

CIRCLE 3

Give me liberty

That's what Patrick Henry said in the Virginia House of Burgesses. He was trying to persuade that body that Virginia should join with the other colonies in declaring itself independent of the mother country.

The Revolution was coming. He wanted to join in. He knew that his personal liberty was at stake, and he wanted to ensure future enjoyment of those unalienable rights — those that the French and English philosophers said were every man's birthright.

Of course, there were those who thought the coming revolution flew in the face of law and order — that it just wasn't right, and shouldn't happen. Those people were called Tories, and they lost everything as the tide of Revolution engulfed the land. Freedom for the individual won. The people triumphed.

I've said it before. There's a revolution going on right now. It's a revolution for personal computing. It's a revolution that again says the individual can take charge of his own destiny. It's allowing individuals to pursue their personal good using a small machine that amplifies their personal power enormously — the personal computer.

We've all heard it said that those who fail to learn from history are doomed to repeat it. It's true in personal computing as elsewhere, for we have people espousing Tory-like ideas today. I saw two articles just recently that make their ideas all too clear.

The first said the use of personal computers (although the author who wrote the article disdained to even call them that) should be closely controlled by the all-wise data-processing department. Otherwise, the (presumably) thieving employees

would (mis)use them for (heaven forbid!) their own purposes. Clearly, the author thought, such misappropriation of company property is not to be tolerated.

The second writer, in a burst of charity the like of which has not been seen for many a day, said that manufacturers must really clean up their act in after-sale support. After all, the argument went, with so many systems soon to be sold to computer neophytes, who would protect those neophytes from themselves as they attempted to cope with the terribly sophisticated products that are being made available? Only the manufacturer has that wisdom, the story said.

Both those writers are editors of magazines read by people in the data-processing industry. I've got nothing against data-processing folks. I used to be a DP manager. I've got nothing against editors. I am one. I do object to being overly helped and overly protected. Give me liberty.

The problem is that ideas like those in the articles I mentioned are old-fashioned, as were the notions that the colonies should remain allied with England. The ideas are not in step with the times. Today's idea says individuals can use their own computers. They don't need intermediaries — some have called them "high priests" — to enjoy the benefits of computing. The companies that believe people can use their own computers have done things to make that happen. As a result, I've found after-sale support in the personal-computer field to be a phone call away. (Try getting help over the phone for an IBM 370!)

But the guys who wrote those arti-

cles don't know that support is so good because they never tried to get it, it seems.

They still cling to the idea that people need to be controlled and helped in their enjoyment of computing. It's the old, outmoded, Tory-like position. It's about to be swept away in the revolution that's coming — indeed is already happening.

So give me that liberty which Patrick Henry so ardently desired. Give me the chance to make a mistake. I won't get mad. I'll learn.

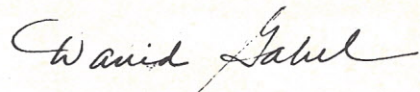
Give me the liberty to play a game on the computer. Even if it is at work. Even if it's not on my lunch hour. Is there anyone in the free world these days who thinks creative people (and people who use personal computing are creative just by definition) can go on for eight hours creating without a break? I'll be the better for the little relaxation the game afforded. And I'll do a better job, you can be sure.

Give me liberty. Don't make me submit to the old-fashioned ideas of those who would "help" me use computing. I'm smart enough to know when I need help.

Give me liberty. Don't stifle me with the fear of the computer as a company resource, not to be trifled with. Let me know it's my computer, that I can use for myself, whether I bought it or the company did. If I'm more productive with my computer (and I will be) then it's better for my company anyway.

Give me liberty. Let me make my own mistakes. I want to learn.

Give me liberty. My computer and I will do just fine, thank you.





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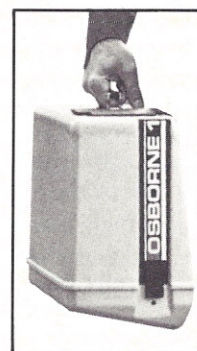
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CIRCLE 4

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FEEDBACK

LOGO lovers

Dear Editor:

As a TI LOGO owner and user, I was interested in the article by Steven Berry ("Progressive learning by computer," December 1981). The article gave a good introduction to the spirit of learning with TI LOGO and to some of its capabilities.

I was especially glad to see the sentence, "As simple as these exercises are, the language also enables students to explore a succession of increasingly complex capabilities." This is true. The language allows the manipulation of arbitrary list structures, and opens up the world of recursion. Nearly any feature one would want the language to have can be added by defining procedures.

I was a little confused, however, that the accompanying illustration was of an Apple instead of a TI 99/4. That illustration was misleading.

Roger B. Kirchner
Professor of Mathematics
Carleton College

Editor's note: We are guilty as charged.

Special question

Dear Editor:

For four hours a day I swim in mathematics, evaluating the stock market for my own accounts. I analyze 270 stocks per week and 30 stocks per day, as well as the usual broad stock-market indices. Each stock (daily or weekly) requires 18 stock-factor entries. Market indices and stocks are also graphed daily. All data are up-to-date. Besides paper and pencil, my equipment includes the daily newspaper and one calculator, a Unisonic L.C. 500.

In the four issues I've received of

Personal Computing, there is no mention of any product or service which could smooth my task or reduce my workload. I'm relying on you and/or your staff to search the "field" and mention a product or service that I should consider, if any exists as yet.

Congratulations to you on a truly handsome publication.

James D. Franks
Hingham, MA

Editor's note: By now you should have seen our January 1982 issue containing an article entitled, "Intelligent investment management by computer." This article should answer some of your questions and get you well on your way to solving your problem.

Taxing points

Dear Editor:

After reading your December 1981 issue, I feel obligated to enlighten Robert Perry, author of "Tax-preparation software: how to ease the IRS blues," on two points.

The first concerns the Employee Business Expense form which is used several times to illustrate the article. Deducting the entire cost of the personal computer, monitor, disk drives and printer in the year of acquisition will certainly not "ease the IRS blues"—your taxpayer would be well advised to find an accountant who will depreciate these assets rather than expensing the entire amount.

The second point concerns the unjustified propagation of the sleeve-garter, green-eyeshade stereotyped accountant. Perhaps the author should meet some of the dynamic, progressive individuals who are proud to be part of the accounting profession today. He should not rely on the Charles Dickens' account of an English bookkeeper.

If the members of my profession

FEEDBACK

are conservative when it comes to computer acceptance, it is with good cause. We have been involved in cleaning up too many disastrous, ill-planned computer conversions.

Ronald C. Knecht, CPA
Portland, OR

Editor's note: We hope our article helps reduce the number of disastrous computer conversions.

Payroll thanks

Dear Editor:

We were delighted to read your article on payroll packages which appeared in the July 1981 issue of *Personal Computing*. Articles such as yours are sorely needed to help businessmen make intelligent choices when selecting software. Because of that need, such articles must be accurately researched to preclude the chance of misleading prospective customers. You have done an admirable job all the way.

In future marketing efforts, we will often reference your article. We are sure that many businessmen who read it carefully will agree that the time spent in your research will be of great benefit.

Once again, our thanks, not only from CPI, but from the total business community.

Daniel A. Ellis, President
Computer Products International
Matairie, LA

Kitchen update

Dear Editor:

I am writing regarding the Buyer's Guide printed in the November 1981 issue of *Personal Computing*, on page 102 ("Computers in the kitchen"). Unfortunately, the listing is incorrect.

Some time ago, Patient Care Data Systems did sell a dietary program

called FOOD for \$29.95. Since then, the company became PCD Systems, Inc., and FOOD was revised, improved and updated. It is now called NUTRI-CALC. NUTRI-CALC is a much more sophisticated program, and sells for \$350. FOOD is no longer available.

Jody L. Scherrer
Director of Marketing
PCD Systems, Inc.
Penn Yan, NY

Help requested

Dear Editor:

Approximately five months ago I subscribed to your magazine, hoping I could learn of more ways to apply my computer. I also wanted to find more software available for it.

I own an IBM 5110 system, with dual disk drives, a 120 cps printer and 32k memory. It operates in BASIC with programs and procedure files as standard equipment. The procedure files can be used to do a sort in six different fields at one time. I have run a sort on this system for over 2000 vendors in six fields in a little over two minutes.

If you know of anyone who works with communications for the 5110 system, I would appreciate if they could contact me and supply me with information about that application. I am also looking for other software sources.

Paul S. Reese
243 New Elizabeth St.
Wilkes-Barre, PA 18702

Kitchen delights

Dear Editor:

I read your article "Computers in the kitchen" in the November issue of *Personal Computing*. I'm glad to see that someone is putting the computer

to work on home chores. I have been using a "Main Course Planner" program to help with the problem of what to have for dinner for over two years. Unfortunately, you were apparently not aware of this program.

The "Main Course Planner" program generates a list of suggested main course tailored to the user's tastes. It has a unique feature that is different from the programs you mention in your article in that it is self-modifying and continuously adapts the list to the user's actual eating history.

I find that my family enjoys their meals much more since I've been using this program, due to the increased meal variety. I also find meal planning more enjoyable.

The "Main Course Planner" program is on tape for the TRS-80 Model I, Level II, 16k computer. It is available from SCDC, 223 Cedar Heights Dr., Thousand Oaks, CA 91360 for \$9.95.

Gwen Olshove
Thousand Oaks, CA

Shopping dilemma

Dear Editor:

I just read the January issue and I thank you for your article, "Selecting your computer and your computer dealer."

I recently bought my first system and there is no way that I can accurately communicate to you the nightmares and cold sweats I experienced before I decided what to buy.

But it didn't have to be that way. If I had known what I needed and what I wanted to spend before shopping, it would have made my task that much easier.

Keep those articles coming for those who have yet to enter the world of actual shopping.

Jerome Faust
Ypsilanti, MI



“We provide business programs as individual as your business needs.”

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OUTLOOK

New personal-computer TV series

A joint venture to provide programming for consumers on the use of personal computers has been announced by executives of American Educational Television Network (AETN), in Irvine, Calif., and Miller Technology & Communications, based in Phoenix, Ariz.

The new 13-week programming series will air on the American Educational Television Network over a period of one year.

The series is being designed for the professional and small businessman. Each 30-minute program segment will contain 24 minutes of educational content and six minutes of advertising—one of which will be offered to local broadcast stations for sale in their markets.

AETN will broadcast the series on Saturday mornings to its network of cable and UHF broadcast stations. The first broadcast is scheduled for late March 1982.

Camp for adults

Computer Camp, which calls itself the pioneer of summer camps that educate children about personal computers, is branching out. The organization plans a computer camp for adults, whose first session will take place on the sixth of this month at the Club Mediterranee in Ixtapa, Mexico.

To participate in the event, one need only pony up \$600, along with the normal Club Med fee. For that fee the participants will receive 36 hours of hands-on instruction, roundtrip jet transportation, accommodations for seven nights and three meals a day.

Denison Bollay, president of the Computer Camp, says the choice of the Mexican location was a good one. "The learning environment is very important," he says. "The atmosphere we have captured at Ixtapa will generate enthusiasm among our guests."

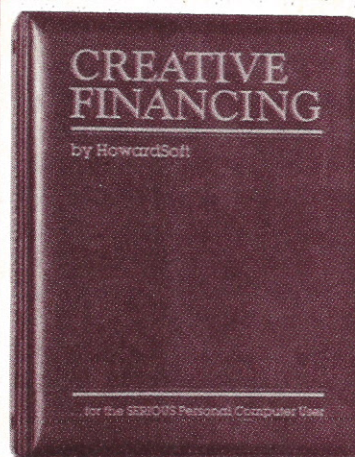
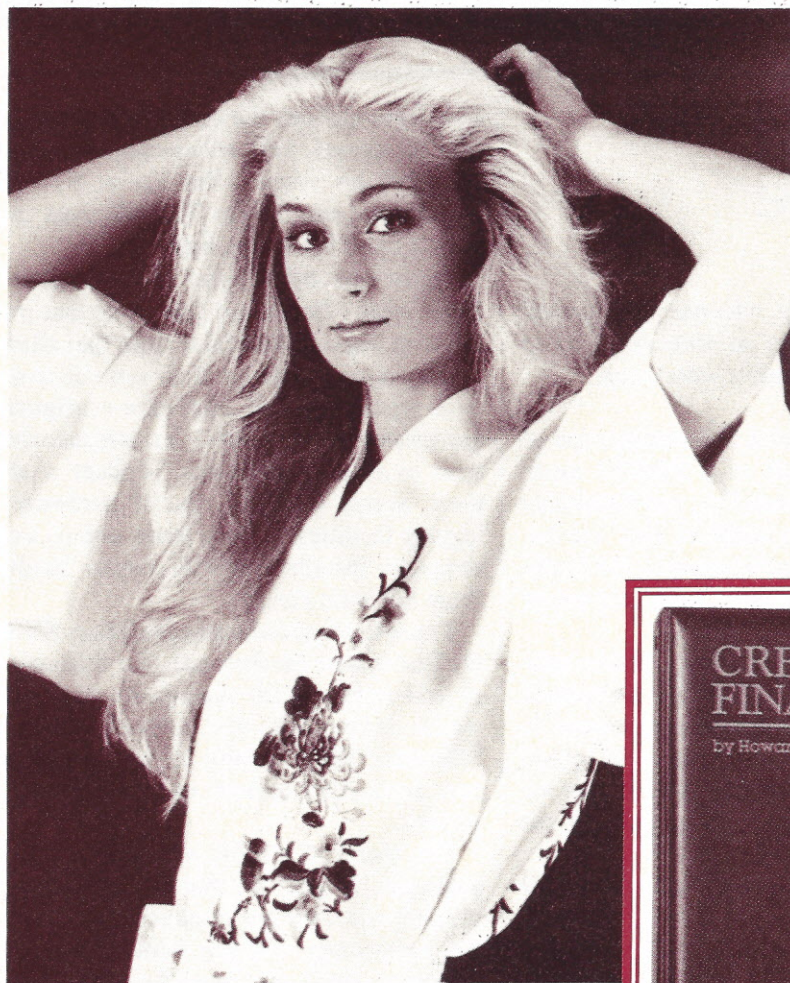
Sessions will be scheduled weekly. Reservations should be made through Computer Camp, Inc., at (805) 969-7871.

How about swapping those computers?

A high-technology flea market, Computer Swap America, has been organized to provide consumers with an opportunity to buy new and used computers, software, diskettes, disk drives, printers, books and other computer-related equipment.

The show will make its debut in Southern California on February 6 at the Orange County Fairgrounds in Costa Mesa. It will then travel to the Santa Clara Fairgrounds in San Jose. Further information can be obtained from Computer Swap America, PO Box 52, Palo Alto, CA 94302.

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CIRCLE 6

Be careful of the ultimate

Ed Warshawer

Editor's note: The author, who has been around computers a long time, gives us some thoughts to ponder as we consider the latest whiz-bang.

Not too long ago I attended a demonstration of VisiCalc that was presented to a TRS-80 users' group. The demonstration went fine, and I must say I was impressed by the capabilities that are becoming available for personal computers, the Radio Shack TRS-80 personal computer being only one of those machines.

After the VisiCalc demonstration, another software demonstration was held. This one was aimed at the software enthusiasts. It was a milestone in software for personal computers. One could indeed think it was the "ultimate disk operating system for the TRS-80," as the person sitting next to me breathed.

The excitement was felt throughout the audience as the speaker, a member of the users' group, continued to show one amazing feature after another. The software was really great, and it worked the first time, too.

There were new directory commands, device routing, spooling, and other goodies that brought some people to the edge of their seats. And me? I was also tremendously impressed, but not at the new innovations being presented. Instead I was surprised that all these older features were now being introduced to the TRS-80. Older features? What I mean is these are features that have been around for a while on some of the mainframes and minis, but, of course, on the TRS-80 they are new.

These features caused me to reminisce. I remember very clearly some of these exact features being announced in the early 1960s, after I had spent a number of years on those real biggies (the one's with the vacuum tubes).

I continued thinking back to when I worked on my first disk operating system (on the Burroughs B5500 computer). The software had features similar to those being discussed, like device independence, routing to other files or devices (then called label equation), and spooling (then called printer backup).

As I was visualizing my old Burroughs days, I heard the speaker mention the word "SYSGEN."

This feature allows the user to configure his system, load his drivers, set various options and customize them for his system. But again, SYSGEN is a brand-new term for the TRS-80, even though it's been around for a long time.

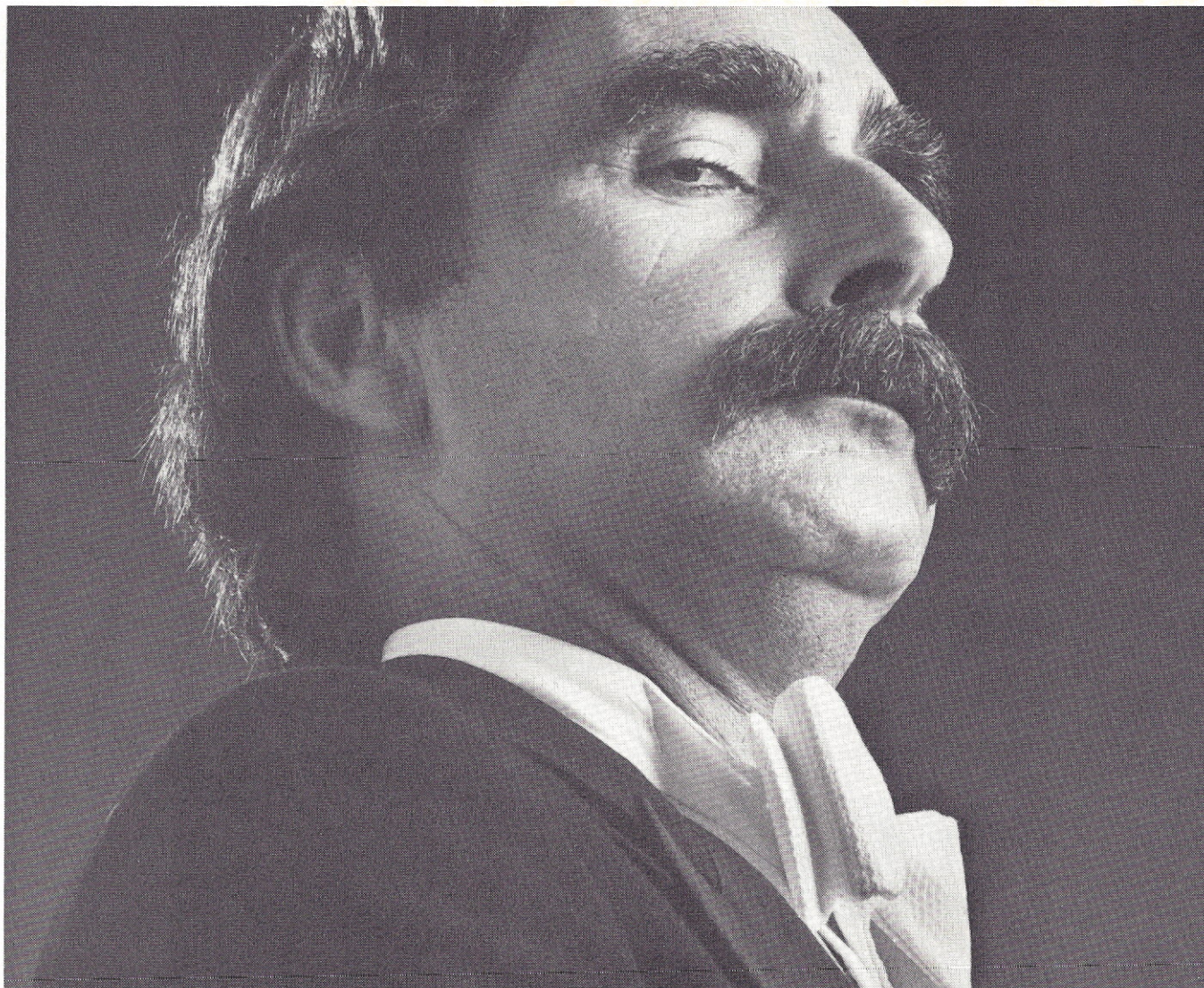
I must date myself again and go back to the early 1960s when I first heard that marvelous word SYSGEN. It was a wonderful feature that allowed users to customize and design their systems to meet their data-processing and hardware-configuration requirements. Customizable features included: region sizes to meet applications, resident modules, options, access methods, special hardware devices, logging facilities, generic terms and on and on. All computer installations with similar hardware had these fantastic choices.

The system specialists were all busy SYSGENing the best system for their use. The different computer sites tailored their systems so effectively that it would take weeks for someone from another "identical" site to be able to run a simple payroll or cost accounting system on a differently tailored system.

The moral of all this is beware of the complex packages. If you are running programs and are pleased with their performance, and if you feel that you are getting what you want from your personal computer, don't dive head first into every revolutionary software package you see. Just because an operating system keeps accurate time and changes dates after midnight, don't buy it if you are in bed every night at 10:00 p.m. with your computer powered off. And don't buy software that you can route to various different devices when you don't have a printer or RS-232 interface. Remember, the more bells and whistles you have in your software, the more disk space they will occupy. More memory may be required. More complexities in the software lead to more possibilities of subtle problems. When that happens, changes to software become a continuing maintenance procedure.

No really complex software will be immune to the continuous changes that are usually required, even on a personal-computer system. These changes will again divide users, so that those having the same software and hardware may still be running on different software revisions, since some will be faster to install fixes than others. This, of course, can lead to incompatibility between identical systems.

The good old Radio Shack TRDOS-2.3 is still an excellent investment for only \$14.95. It may very well be the ultimate operating system for your TRS-80 computer.



A Case For Discrimination.

Discriminating computer users don't want the *best known* word processing software. They want the *best* word processing software.

Hewlett Packard, for instance, spent 9 months comparing 7 microcomputer word processing software systems—including the most popular brands—for distribution with the new HP125 microcomputer.

Hewlett Packard's conclusion: Spellbinder is superior to every other system evaluated.

The reason? Spellbinder's unrivalled ease-of-use and superior capabilities. Spellbinder requires fewer keystrokes for entering and editing text, and provides more flexible printing options without changing the way you enter text. Spellbinder and an inexpensive microcomputer easily rival dedicated word processing systems costing up to *three times* more.

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Best of all, Spellbinder's lofty capabilities are available at a very competitive price. In fact, some of the bigger names in word processing packages demand a much higher price, for a package with far fewer features.

Hewlett Packard wouldn't settle for less than Spellbinder. You should be just as discriminating. See your nearest computer dealer for a demonstration of Spellbinder. Or call Lexisoft at (916) 758-3630.

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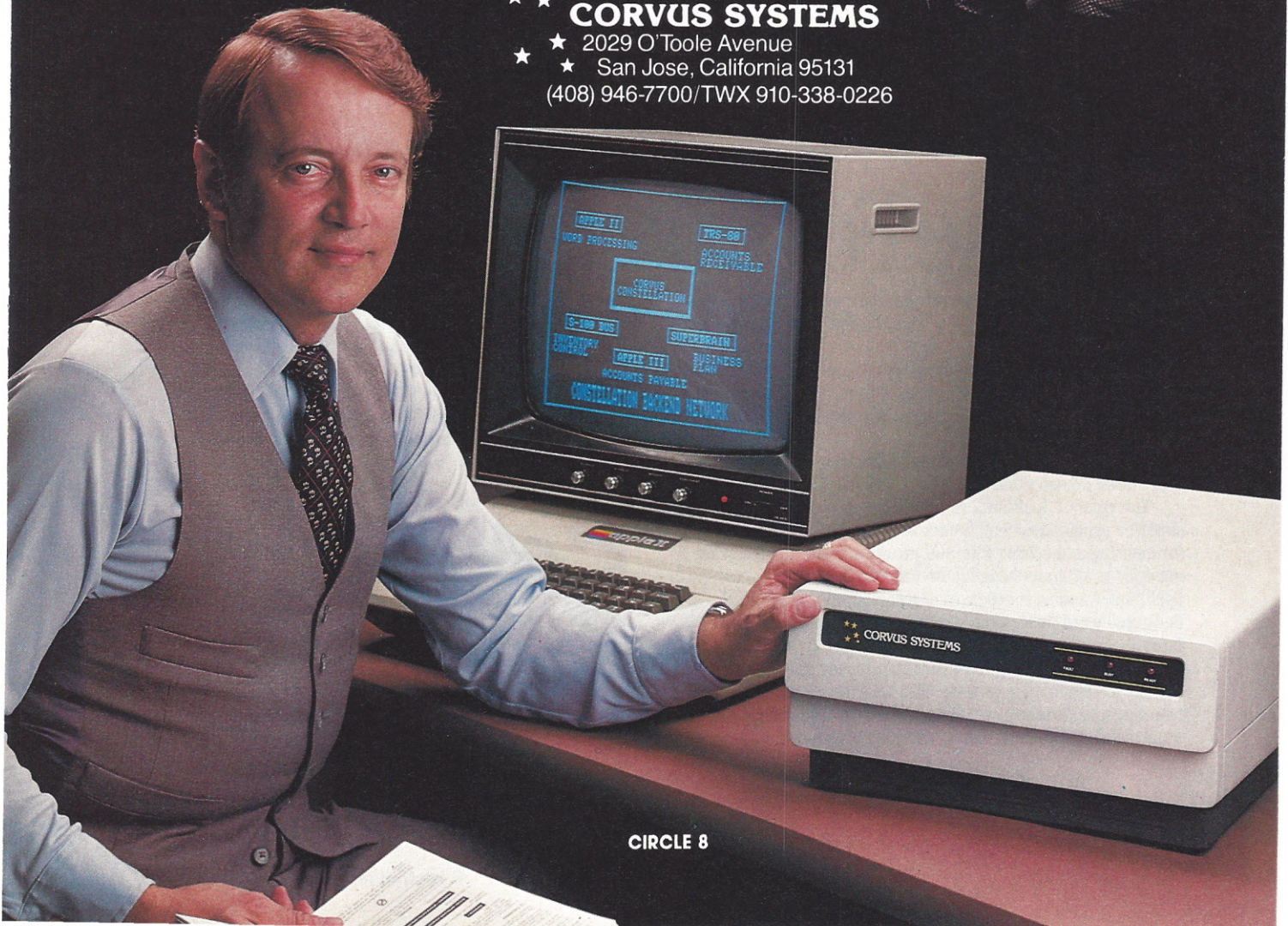
The Corvus Omninet links up to 64 computers in a state-of-the-art multi-processor network. It provides shared mass storage, pipes for inter-computer communication, and system spooling for sharing of peripherals such as printers. Performance far exceeds that of larger and more expensive networks.

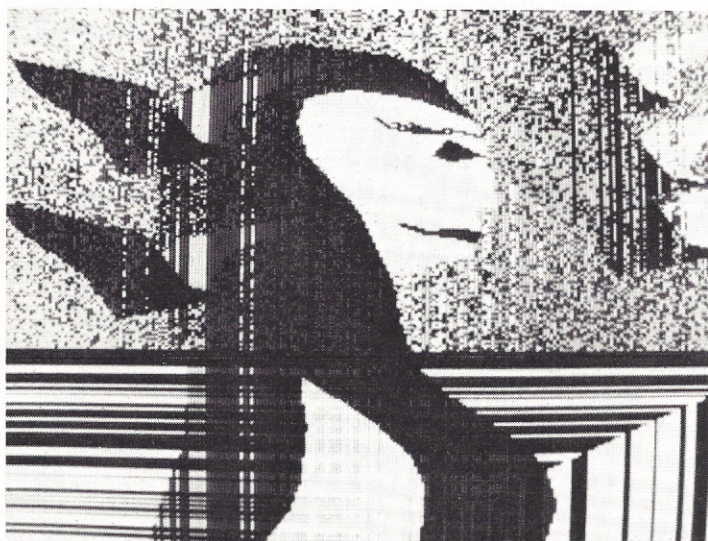
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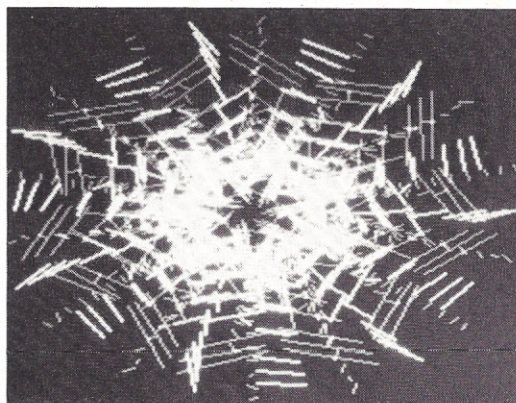
Fairy Princess



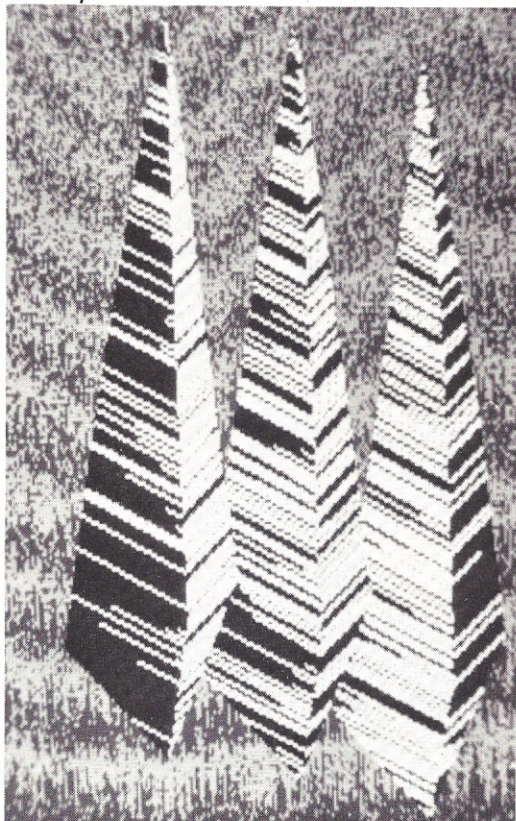
The Wonderful Mandarin



Empire of Birds



Galaxy



Stonehenge Illusion

©All Photos reproduced courtesy Peter Stampfli

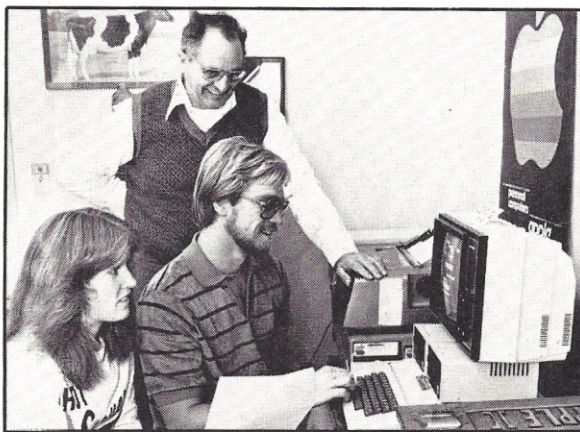
The photographs above were submitted to *Personal Computing* by Peter Stampfli of Sweden. He states that "Computer systems with graphic displays come close to being a new kind of magic brush, a brush that can not only draw points and lines, but whole patterns—portraits of people, objects or landscapes—on command. You can also try different versions of the same picture until you find the one that appeals to you the most. You will discover a new universe where only your fantasy and imagination reign."

From Bessie to "number 365"

For years dairy farmers have been shipping herd data to several mainframe computers across the country. They get the processed information back about three weeks later. Now some dairy managers—like Dr. Manuel Borges, of Chico State University in California—are using personal computers to supplement the batch processing with more timely data.

The batch-processed information is used to determine optimal breeding and milking patterns; which cows get bred, when, and to which bulls; and which cows are producing enough milk measured against feed, seasonal and herd factors. All this data can then be crunched into a dollar value for each cow and bull at any given time.

The advantage of personal computers is speed of response. As Borges says, "As soon as I pull this list off the Apple, there are four cows that are going to be put on the truck. We can make decisions right away based on the information from the computer.



Students at Chico State University in California learn to solve "dairy problems" using an Apple II.

"The Apple does the records here. In the morning I boot up the herd disk and it reports on the cows that have to be bred out today, this week and this month. We primarily use two pieces of commercial software: VisiCalc for my work and PFS (Personal Filing System) for the data base.

"VisiCalc does the mathematics. It allows me to change the cow's body weight, and gives an immediate readout all the way down.

"We are using PFS as a data base, and I use it to do all the records. My wife even does her checkbook

on it. I have a colleague who looks down his nose at my Apple. He uses a big machine. The other day he came by practically on his hands and knees to ask me if he could use the Apple. He then told me that his machine had been down for a week!"

The bottom line is that for the price of an Apple system Borges can get information in an hour that used to take three weeks. Borges also knows of dairy farmers with less than half the size of Chico State's 186-cow herd using small computers profitably.

Borges' students have to learn some computer science and be able to do some programming to make it in dairy-farm management, he feels. "If they can't, they won't make it. The students have cows. To calculate their milk check they have to do a lot of arithmetic. So we put those figures on the computer. Now they each buy a disk and write a BASIC program that does their calculations directly.

"My friends keep saying that you can't do anything with the Apple, you have to have more core memory. They are wrong. I can do 99 percent of the work on the Apple." As for the other one percent (mainly complex statistical calculations), Borges is getting a modem for the Apple to use it as a time-sharing terminal when needed.

They don't call the cows Bessie, or Elsie, anymore. "Number 636" is more like it. But dairy farmers have learned what all businessmen who survive have learned: There's precious little romance in what you do if you can't write the bottom line in black ink. Personal computers are helping them reach that goal, and stay there.

Software protection: the law

Choosing among copyright, trade-secret and patent protection for software is difficult, at best, according to speakers at a recent conference on software protection. The conference featured speakers from the three sponsoring organizations—the Computer Law Association, the U.S. Copyright Office and the U.S. Patent and Trademark Office—as well as attorneys who specialize in patent, copyright and trade-secret law.

According to the speakers, copyright is the easiest protection to obtain. You receive it merely by "creating an original work" and recording it "in a

continued on page 97



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BUSINESS COMPUTING

Keep your costs bite size

You can stop reaching for financial
bromides and start
identifying your cost
villains by using
your personal
computer

PHOTO BY STEVE SAGALA



It's kind of like a control panel in the cockpit of an airplane. When you're two degrees off, it lets you know. Then it's up to you to figure out what to do about it."

The speaker is John Nye, executive vice president of Ammon Financial Corporation, a management-assistance firm based in Dallas, Texas. He compares the way personal computers help to control costs to a navigational device. "But the manager is the pilot," he states. "A computer is a tool. Given the correct data, it can give you all the information you need to make sound financial decisions, but it can't make those decisions for you."

Phil Russell, computer

consultant for Richard O. McCall, Inc., a financial-planning firm based in the southwest, agrees. "A computer gives you better information. If a person is a good manager he can take that information and make money with it."

The main type of information that these men are talking about is cost control. In your business, you are faced

with many decisions that affect the overall status of your firm on a daily basis. Many of these are associated with cost control.

A computer can help you to control

many different types of costs. Given the correct information it can help you to keep a tight lid on your receivables, to turn over your inventory faster, to identify bad inventory so you can turn it into cash, to lower your payroll and associated costs and to increase your cash flow. The main way the computer does this is by comparing forecasted versus actual costs, and by allowing you to manipulate the forecasts to see what effect changes would have on the results. It also provides a convenient space for data storage and can keep your costs organized.

Above all, a computer can help you

to do these things much faster than you could without one. The information is at your disposal at the touch of a button. But, in order to use a computer to do this, you need the proper software.

Speed and versatility

Many different types of software are available to help you to control your costs. Probably the most important is VisiCalc.

VisiCalc is published by Personal Software of Sunnyvale, Calif., and is available for most computers in one form or another for approximately \$200. It can help you to prepare all sorts of financial reports and then to alter those reports by changing one or more variables, while still keeping an accurate bottom line. People who use VisiCalc like it.

John Nye likes VisiCalc's speed.

"We have a complete package of software for all of our business functions," says owner Bill Hess. The software includes packages for mailing-list management, payroll, general ledger, fixed asset with depreciation schedules, accounting, open-item accounts receivable, manufacturing inventory control, wholesale/retail distribution, building materials and accounts payable. It all adds up to efficiency, and at a low price.

"I priced a similar software package for \$75,000," Hess says. "This package sells for \$8000."

A & A has become a regional distributor for IMS software. "We modified the IMS software for our own use," says Hess' son Tyson Hess. "IMS has taken some of our suggestions and incorporated them into the software that it markets."

properly. You should try to find a canned program that best meets your needs."

Nye recommends software by R & E Business Systems. "The software was designed by a CPA and a programmer. It has very few problems."

The software you buy is up to you. Be advised, however, that there will probably be things you won't like about any software you choose. People even have complaints, minor though they are, about VisiCalc. Nye wishes it were available on CP/M, and Chris Aves, president of Petcom Systems, a personal computer designing and programming service for the oil and gas industry, wishes that it could sort a column of numbers. Still, Nye admits that every time he uses VisiCalc he finds something new about it. If you're planning to use a computer to control costs, VisiCalc could be a valuable part of your software library.

Once you have the software you need, you will then need correct information before beginning to control costs. "The main ingredients for effectively analyzing a business are accurate figures for cash, accounts receivable, accounts payable, payroll and inventory. You can't help anyone control his costs if you don't have this information," says Nye, whose firm deals mainly with clients in distress situations. "We feel so strongly about this that we insist that our clients let us keep the records for their accounts receivable, accounts payable and payroll and that they supply us with accurate inventories and cash statements."

Find the villain

If you are in any business other than banking, you probably don't appreciate customers who use your money for their own purposes. A computer can help you to identify the villains by aging your accounts receivable.

"There are two other major suppli-

"The main ingredients for analyzing a business are accurate figures for cash, accounts receivable, accounts payable, payroll and inventory."

"It used to take four days to get a financial report in handwritten form. With VisiCalc, I can get it from start to finish in 30 minutes."

Phil Russell especially likes VisiCalc's versatility. "If you can think of a formula for something, you can use it on VisiCalc," he says. Russell also says that VisiCalc is the wave of the future in business. "By 1990, everyone in business will have to know VisiCalc or a program like it to survive."

Although VisiCalc is very popular, it isn't the only software on the block. A & A Trophy Company, one of the major suppliers of trophies to small trophy houses in the U.S., uses software manufactured by International Microsystems (IMS), a Kansas City software house.

One good reason why manufacturers should take advice on modifying software is that many people who design the software never use it. "It shouldn't be that difficult to design a software package that is flexible enough for everyone and that meets AICPA (American Institute of Certified Public Accountants) standards," Nye says. "But most of the people who design the software have very little knowledge of how it's used."

One solution to this is to design your own software. Many people have done this with very little programming experience. "I turned out my first program in two months," Nye says. He doesn't recommend this as the way to go, however. "It takes too long to get a program to work

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You spent a lot of time searching and researching to find just the right computer. But when it comes to compatible software, you're stymied. Where do you turn? What is the key that unlocks the software mystery? The answer is elementary. It takes a company with the expertise and research facilities to discover and develop a wide variety of quality software programs — a company with a staff of experts who understand both software and hardware — a company that is not only reliable but offers unique 24-hour services and — a company dedicated to being your software company.

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The LBS is designed for law offices with up to 25 attorneys and 35 timekeepers, including paralegals and secretaries. The system distributes all Time and Expenses to client accounts or designated Overhead Accounts, and produces monthly Client Review sheets. After any adjustments it also provides: ready-to-mail itemized bills, monthly Office Management Summary, Aged Receivables Report. An Accounts List is also built into the system.

Complex transactions recording is reduced to a minimum because the LBS system is based on daily timesheets prepared by each timekeeper with a complete system for coding client matters and expenses. The attorney auditing the pre-billing review form can choose various predetermined rates, or bill on retainer, contingency fee or an adjusted basis.

The Office Management Summary provides a financial analysis of each attorney's billings, aging of his accounts receivable and an analysis of the work effort of each timekeeper and total

for the firm. The Accounts List summarizes current activity and status of each client.

The LBS is designed so that even first-time computer operators can install the system without expert help.
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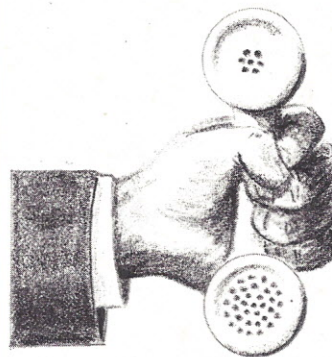
State tax computation for the following states is available at additional cost: Arizona, California, Illinois, Ohio, Oregon, Maryland, New York,

Utah, Virginia and Washington, D.C.

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BUSINESS COMPUTING

ers to small businesses in our industry," says Bill Hess. "Some of our customers play a little game with the three of us. They buy from one of us and don't pay. Then, they'll buy from supplier number two and won't pay. Finally, they'll buy from supplier number three. By this time, they'll usually have enough money to pay off the first supplier. After they pay him off, they'll order from him again and start the cycle all over."

By aging its accounts receivable, A & A is able to identify those people. "We'll tell them that we'll be happy to ship their order C.O.D., but if they complain that they are good customers and pay regularly and shouldn't have to pay on delivery, we print out their file and give them the evidence. Before we had our computer we weren't able to do that. The problem accounts were very difficult to find.

"We used to pay an

outside accounting firm \$500 a month to do our books," Hess says. "It would take three weeks to get our material back so that we could send out bills. Now we can get 400 invoices printed, stamped and mailed in four hours. Our billings get out faster and we get paid sooner."

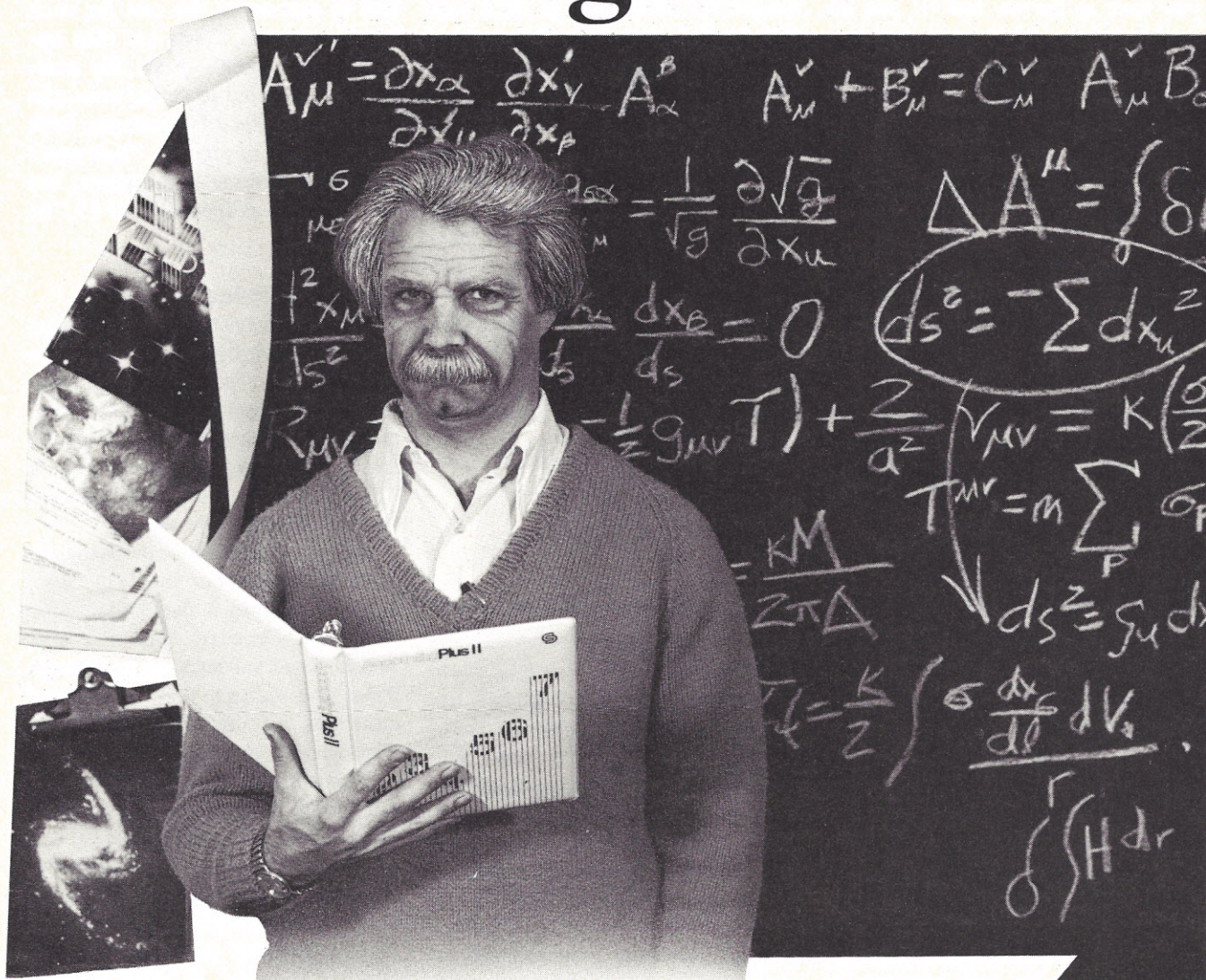
The \$500 a month that A & A used to spend to get its accounting done can buy a lot of hardware. The hardware A & A chose consists of three Intertec Data Systems CompuStar computers, each with 64k of RAM and two disk drives. Each computer has access to a 10 megabyte hard disk. The printers are a Texas Instruments Omni 800 and an NEC Spinwriter.

With tightened
up receivables



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comes a better cash flow. More money comes into your business because bad debts are minimized. More cash on hand saves money on interest since you have to borrow less. If you do need to borrow money, your computer can help you there also.

"You just push a button and print out your accounts receivable," Tyson Hess says. "Then you just bring the printout down to your banker and ask for a loan."

Money in your pocket

The less inventory on hand, the more money in your pocket. Without a computer, it is very difficult to keep a handle on everything that's in stock,

tomers. Using sales patterns compiled on an hourly basis for the preceding six weeks, the computer helps to predict how many employees are needed for every hour of each day. "We know for example, that we need 12 people to have a \$700 hour, but we need only three people for a \$100 hour," he says.

Nye, whose computers include three TRS-80 Model IIs, an Altos system with 10 megabytes of hard-disk memory and an Intertech Data Systems Superbrain with two disk drives and 64k of RAM, adds, "We forecast each hour's sales and staff our people accordingly. This gives our customers better service by hav-

be prepared by clerical personnel.

To be more efficient with materials, Nye designed a Standard Costs program for the chain, which allows him to determine the cost for each hamburger sold. Costs are then updated on a weekly basis. By comparing forecasted to actual costs, the program can identify spoilages, theft and giveaway of product. "You won't miss two or three hamburgers, but you will miss as few as 10 or 15," he states.

Finding variances

The main way that Nye's firm uses VisiCalc is in programs similar to the standard-cost program. By forecasting budgeted amounts and comparing the budgeted amounts to the actual totals, variances are found. "Then, it's up to you to find out what the problem is," Nye says.

For construction clients, Nye separates each home or building to be constructed into a department and forecasts the costs for each one. When the actual costs are in, he compares the actuals to the expected costs and, with his client, tries to determine why variances occurred.

"Sometimes it's because of cost increases or because you expected to use a certain amount of material and used more," Nye says. "But once, we found that one of our customers was being billed 30¢ a pound more than he was supposed to be for a certain building material. Without our program, he never would have found it. It was buried in accounts payable. That one instance saved him 20 percent of his costs."

If you determine that your costs will increase through forecasting, you can offset some of those costs by buying now, instead of after costs go up. "We have one client who does that," Nye says. "His cash flow is good enough and he has enough inventory space to make his purchases before his costs increase. Presently, most companies just don't have enough

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"Some people think there's some kind of sex appeal in putting everything on a computer, but you need to take it one step at a time."

especially if you happen to own a company that sells parts. A & A uses its computer to identify which parts sell the fastest and which sell the slowest. "We sell a lot of different items," says Tyson Hess. "Some could sit here for years and we'd never know. Now, we run an inventory report and see what we have. If something isn't moving, we find out, since the same item appears on every report. Then we make a special attempt to sell it and our bad inventory is turned into cash." Through the use of a computer, Hess claims a 20 to 30 percent decrease in the size of the company's inventory.

"This has also increased our turnover rate," he says. "Where we used to have a turnover one to four times a year, our inventory now turns over six to eight times a year."

Forecasting hamburgers

Nye's firm manages a chain of fast-food outlets in southern Texas. One of the major goals for a fast-food outlet is to give prompt service to cus-

ing enough employees to service them at peak hours. This also lowers our payroll costs, which are typically one and one-quarter times the gross salary by not having too many employees on hand during slow periods." Nye says that better service also builds future sales. "Using our method, we can serve a customer his food within 20 seconds after he places his order, which is three times faster than the national standard for the chain."

While a computer may help you to use your people more effectively, Nye says that it won't replace anyone. "I've never seen a case where a computer replaced someone," he says. "A computer won't help you replace employees, but it may keep you from having to add more." In an office environment, Nye says, the computer almost raises employees from the clerical level to the management level because they are performing duties, such as preparing reports, that only managers used to do. With programs like VisiCalc, those reports can easily

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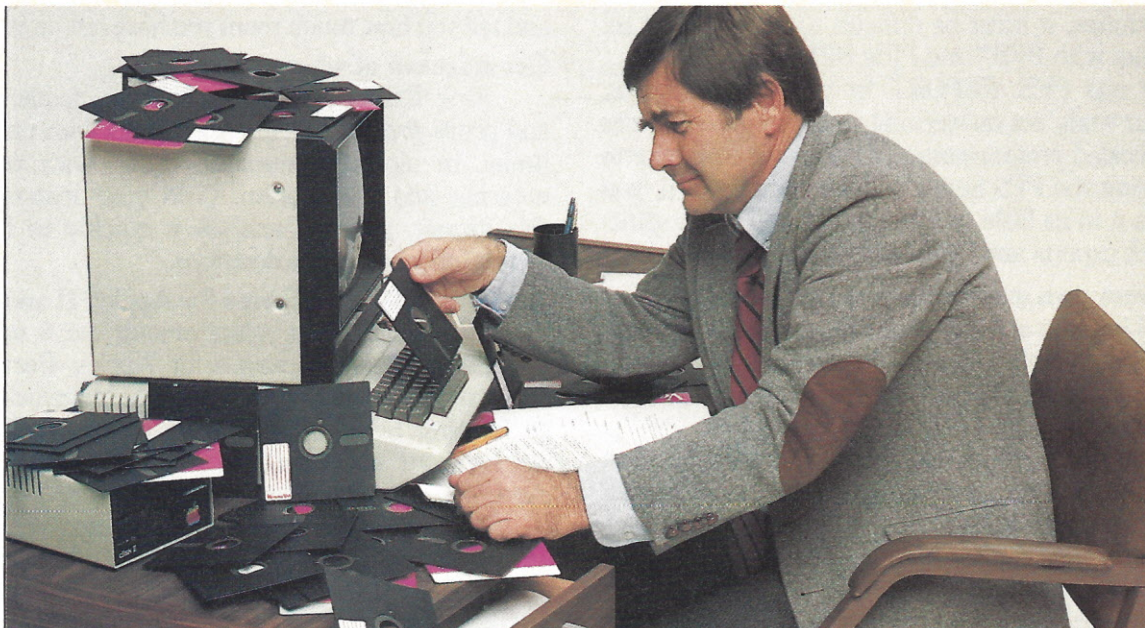
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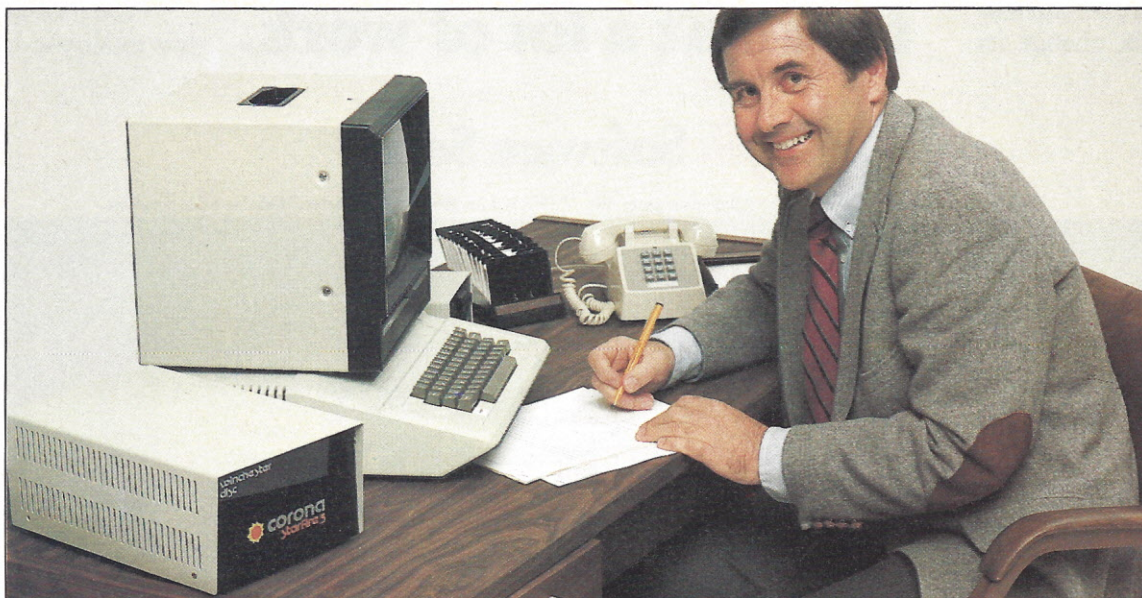
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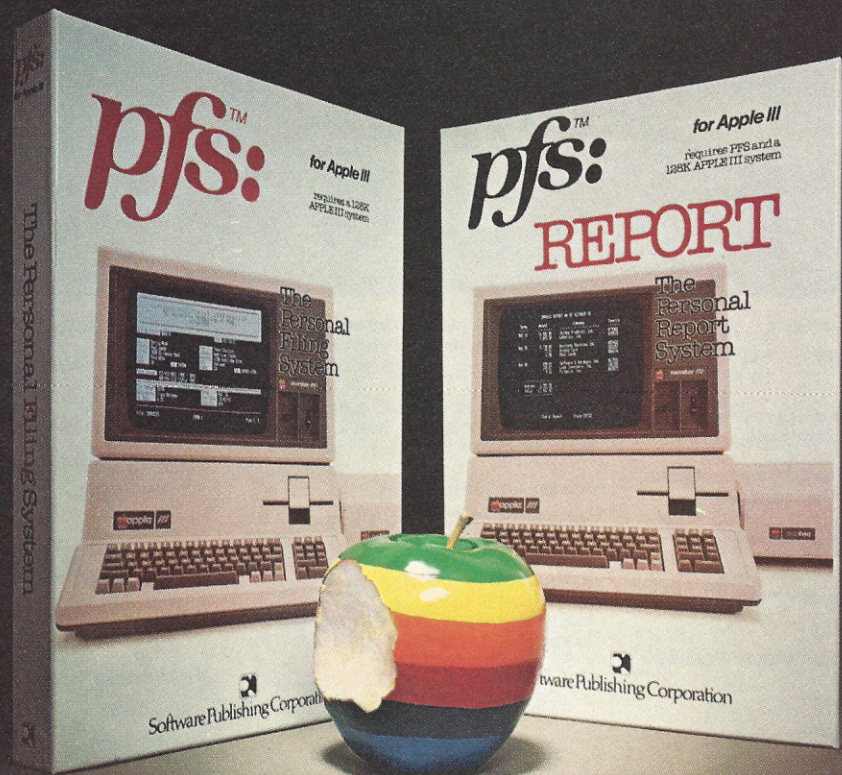
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BUSINESS COMPUTING

The power of purchasing by computer

Managers are exercising their purchasing talents with the aid of manageable, computerized data

Whether you run a one-room schoolhouse or a large corporation, your job is likely to have its tedious and routine aspects. You may find yourself wrestling with a swarm of details, yet your creative, executive functions can depend heavily on these routine tasks.

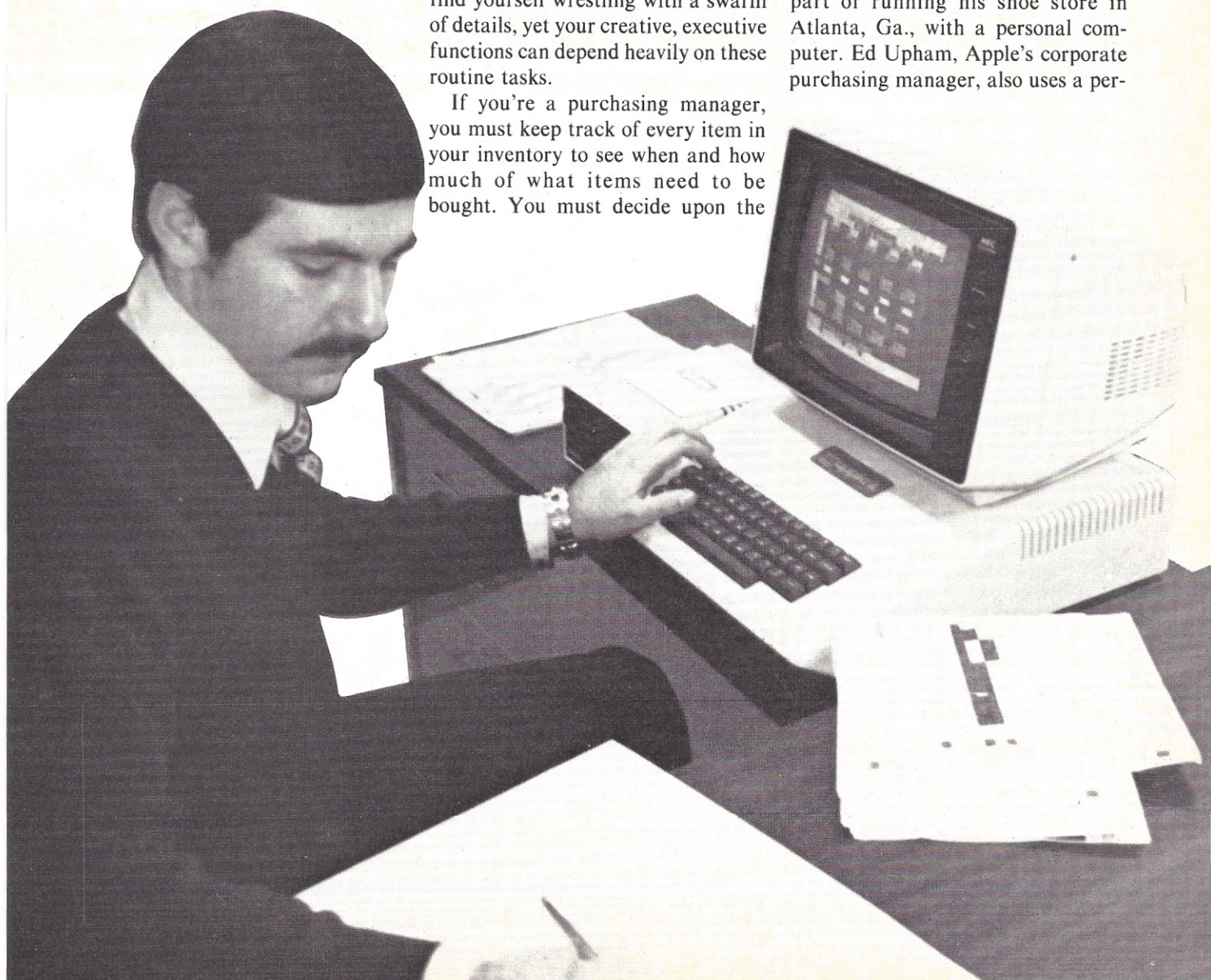
If you're a purchasing manager, you must keep track of every item in your inventory to see when and how much of what items need to be bought. You must decide upon the

vendors from which to buy, and which products to buy from each vendor you choose. You must also track purchases from the decision-to-buy stage to the actual delivery.

Each of these areas can give a manager scope to exercise his talents, once the relevant data have been massaged and maneuvered into a usable form.

There are three ways to get this information into a suitable form. You could spend your evenings and weekends working on it. You could find a small army of tireless, devoted vassals with errorless mathematical and statistical abilities to work on it. Or you could automate.

Bernie Petrocelli chose the third option. He automated the purchasing part of running his shoe store in Atlanta, Ga., with a personal computer. Ed Upham, Apple's corporate purchasing manager, also uses a per-



sonal computer for many departmental functions.

The experiences of these two men are instructive for anyone who wants to alleviate tedium and have more time for managing. You may be involved in manufacturing, or distribution and selling, or simply have an interest in the inner workings of business. Whatever your field, you should profit from knowing what these and other managers have done to improve the purchasing function at their firms.

Purchasing management is a kind of frontier in the world of personal computers. Software specifically intended for this function is just beginning to appear. Presently, two types of broad-function software can be used: data-base managers and numerical spreadsheets like VisiCalc.

Data-base managers work like an electronic filing cabinet/file clerk combination. They can keep and update lists, sort for desired qualities, and they usually generate various types of reports. You can use them to enter inventory figures and vendor information, and run a sort for which vendors supplied a given item. You can also find out which parts are needed by simply calling up the electronic card for that item. The main advantages these automated procedures have over manual systems are their ability to cross-file and the way they compactly store data.

Numerical spreadsheets let you ask "what-if" questions. You can set up a large electronic sheet with everything you buy in columns and everyone from whom you buy in rows. You can enter a change into the program—like what would happen if you bought all of your lawnmower blades from vendors with 60-day terms, but at a higher price. The program can then tell you what the net financial impact would be.

There's no substitute for your own good judgment here. Computers give you the opportunity to base that judgment on better facts—facts that are more immediate, more accurate and

based on a large number of sorts and number-crunching routines. Nor can purchasing be readily automated unless some other functions are automated first.

First things first

Bob Wickham, Vector Graphic's vice president of marketing, says that accounting is the first function businesses usually put on a computer. It's the easiest to justify in terms of giving a tangible return on the hardware/software investment. Next comes order entry, inventory control and the other functions such as bills of material and purchasing.

A bill of material, or parts explosion, tells you what parts are needed to assemble a given item, and also tells you the total quantity of parts needed for several of the given items. Based on information in the data

with 200 or 300 employees would benefit from this computerization, but companies with only several dozen employees could also benefit if they have large inventories that need to be maintained.

A larger computer, with more power and speed, doesn't come cheaply, though. Networks of inexpensive, powerful personal computers may do the job for much less.

For example, several years ago Wespercorp in Tustin, Calif., bought a large machine for \$450,000. Randy Knapp, who oversees purchasing and is the company's CEO, says, "We got the whole system in and it didn't meet our requirements. I'm not saying it was bad. Communications between our company and the supplier were somewhat faulty. They were eager to sell to us and we were eager to buy, and we failed to listen to each other.



PHOTOS BY THOMAS GAINEY

base, you can then determine which vendors sell the items, and at what prices.

Although a computer can be helpful in automating a business, it has its limits. In purchasing, that's defined by the number of items in your inventory weighed against how long you're willing to wait for the computer to digest your data.

Wickham says that companies

At one point I thought we were going to have to scrap the machine. What we did was hire the chief programmer from the computer company and he got it running. But knowing what we know now, we could take the software and put it into a small, complex network of personal computers instead of a single-base system, and it would be a lot less expensive."

Knapp also has some ideas on what

range of companies could benefit from automating purchasing procedures. He feels that any company with over \$10 million in sales should automate.

"We found that task orientation was good up to about \$10 million in sales. That is when you have the entrepreneurs who run the company telling you what to produce, and everybody just starts producing. The systematization of the business really doesn't exist. Most high-technology businesses start that way." Knapp also says that a company building very complex products (or maintaining very large inventories) could start to have trouble at a much lower sales volume.

So how small a company could profit from computerizing purchasing? Knapp says, "The man who is running a nursery-supply business

inventory that fluctuates seasonally and evolves in a fairly regular way from year to year. He uses Systems Plus' Accounting Plus package with an inventory/purchasing module on an Altos computer. This is a fairly large investment for a retailer with one shoe store. So how much has it saved him?

"A couple hours a week," Petrocelli says. "It doesn't sound like much, but when you're talking about management time that you can then devote to running the business, supervising your employees, checking on your inventory and checking your receivables, it makes a big difference."

Just as with large manufacturers, Petrocelli's purchasing system is based on an inventory-control system. The inventory control helps purchasing in some obvious ways. It tells him how often a shoe sells and when.

a manual count system that was performed every six months."

Petrocelli uses the purchasing module to keep track of items that are ordered on a repetitive basis, and must be paid on a repetitive basis. As he says, "I think of a purchasing system as one that has millions of dollars tied up in inventory and uses. . . MRP." (MRP stands for Materials Requirements Planning, a sophisticated institutional computer-oriented procedure used by large companies.)

"I'm just not involved in that. Our business is relatively stable. A lot of it is purchase-order-type activity, where you buy the shoes now and you get the bill in 30 days, 60 days or 90 days. If you have a purchasing system, it ties into your accounts payable. For example, if I buy 50 pairs of shoes today and make a commitment for them, whether I pay for them today or 60 days from now, I have incurred a debt for 50 pairs of shoes," he says. "I might as well let my receivables reflect what my payables have incurred. The biggest mistake small businesses make is buying something that they've already bought and forgotten. They then buy the same thing over again."

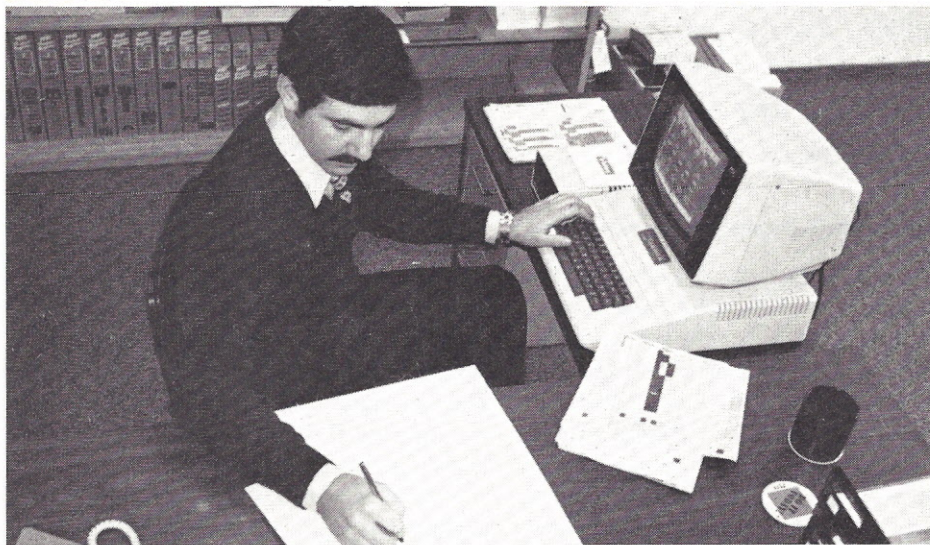
Now that Petrocelli has computerized his store, salesmen have a hard time selling the same items twice. "I finally have something that gives me an edge." Petrocelli uses it, too.

"We look at what we have spent and what we have outstanding by vendor. We know who we owe what. We don't just want to know how much we owe, we want to know whom we owe."

Petrocelli also has another advantage over his vendors. "The machine disciplines the person using it. You have got to count. You have got to keep track. If your numbers don't match, your machine will not let you off the hook. It forces you to match your numbers."

The night watchman

Like Petrocelli, Ed Upham, Apple



on the corner is a prime candidate. He is going cut his staff in half and increase his processing and his visibility in his market."

Shoes and savings

This is the case with Bernie Petrocelli, the owner of Southland Shoes in Atlanta, Ga. In this shoe business, Petrocelli keeps a large stock of mass-produced items—an

Less obviously, it helps keep that shoe from walking out of the store on an employee's foot instead of on a customer's.

"We spot check," he says. "We go in and pick an item at random and see if the numbers match. What has happened is that losses have decreased because employees know that you are random spot checking. Before, shoes would just disappear. There was only

Computer's purchasing manager, uses personal computers for purchasing operations. A multinational operation like Apple, with thousands of employees, must use larger computers at sometime. But Upham uses personal computers in ways many managers and small businessmen could profitably emulate.

Upham uses four types of software with his Apple II's: data-base managers and report generators, financial modeling, word-processors and telecommunications. All are standard, uncustomized software products.

He chose File Cabinet II from the Apple Software Bank as the department's data-base manager. VisiCalc provides financial modeling, and Micro Courier turns Apples into night watchmen for the world com-

used by Upham for modeling the status of contract preparation. One of its prime functions is to help purchasing agents decide between negotiated total prices for all the products Apple buys from a particular vendor, or negotiating item-by-item prices. Without VisiCalc or a similar program, this work would tie up managers for days.

Tracking trends

Another vital function it performs is showing trends of standard costs. VisiCalc allows managers to track pricing trends and extrapolate them into the future. This, in turn, gives them firm extrapolations to take to Apple's financial people for budgeting. Purchasing agents benefit

company rates are lowest. They then get their answers within a day. Operations like Apple need this interfacility communication for inventory balancing and purchasing.

Word processors like Apple Writer and Magic Window are used for contracts. These make it possible for a purchasing agent to agree on contractual changes with a vendor and give him the revised contract before he leaves the office.

Another area in which computerization can help businessmen is the area of cash flow. Upham believes cash flow is the small business number one problem. He says that VisiCalc-type programs enable the small businessman to accomplish what Upham's people do: forecast timing and amount of purchases needed, which works just as well for payroll and capital expenses. And they can also do profit-and-loss calculations.

"The person who set up our purchasing program is not particularly computer oriented and was not extremely familiar with the program. Yet it took her only a month to set up and implement it."

Planning ahead

Jim Ferry at Atari uses VisiCalc on an Atari 800 to develop his buying plans. He gives this example: "We load in supplier capacities. We bounce that against the master production schedule, and we have the computer perform a mathematical analysis of materials allocation by supplier. This generates what would happen if volume goes up 10 percent. The computer then reallocates and we can see if it comes up with a known supplier's capacity."

"We have a rather large computer available to us in the purchasing department, but it isn't economical to put some reports into the large system. That's why I use our 800. I have easy access to it. It sits right there and we can use it as a working tool," Ferry states. "When I first got here we'd take a week to generate a buying plan for a major commodity. It would take that long to thoroughly analyze and assemble our plan. Now it takes less than 40 minutes, as opposed to two of us spending a week of

continued on page 148

munication system Apple operates between its plants in Cupertino, Calif., Carrollton, Texas, Cork, Ireland, and Singapore.

Julie Hidaka heads Apple's purchasing request service station. Apple's 2300 employees have an average of 1500 or more purchase requests at any given time, and many of the people who request information need frequent status updates. The system makes it possible for Hidaka to help each employee without callbacks, since the speed of the program makes almost immediate service possible, as well as yielding a tremendous saving in aggregate employee-hours spent at this task. In addition to the requisition log file, the data-base manager is used to track the status of purchase orders, rejects, repairs and contracts.

The financial-modeling software is

from the speed, the accuracy and the authority it lends their projections.

Apple Software Publishing Company uses PFS Report for its commodity file, purchase order file and accounts payable—including writing checks and vendor listings. These have greatly improved the lives of managers over the past five years. The unattended service capability of communications software like Micro Courier may have done even more for the home lives of managers involved in overseas operations.

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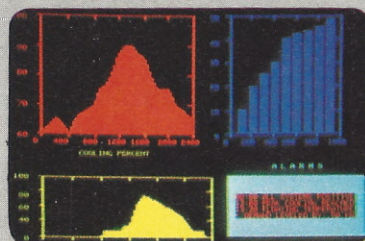
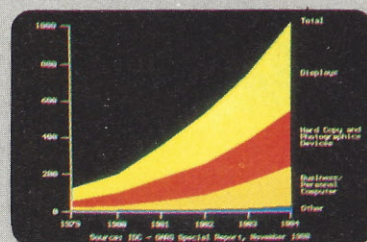
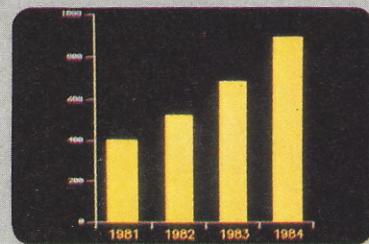
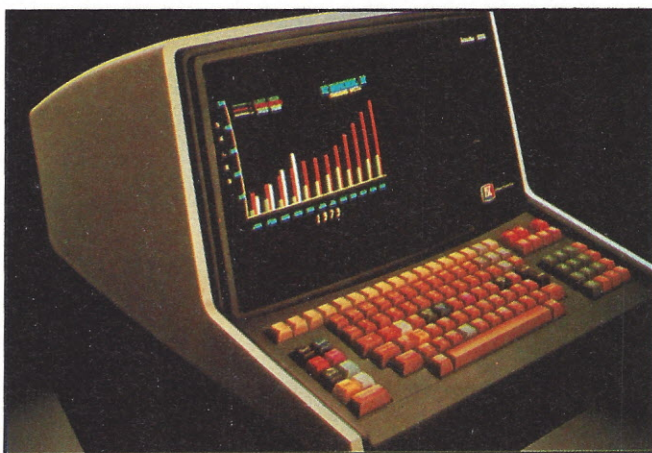
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PROFESSIONAL COMPUTING

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easy with powerful
presentations

If you could make someone instantly
comprehend what all that data means,
couldn't you sail through that presentation?



A picture can often be worth a thousand words, but in this age of super-abundant information, there are countless people in the business world who could certainly find a picture to be worth a thousand numbers.

Businessmen must understand sales figures by product, department, division, month, quarter or year, by region or territory, and all of these versus estimates for competitors, versus the future as projected from industry statistics and economic indices. They must also understand the conflicting formats of pricing and performance information that make it so difficult to choose suppliers wisely. Other companies' salesmen must also be understood, especially when they back a presentation with volumes of data that might justify an order, if the businessmen had a weekend to study all that data. But businessmen want to "get the picture" fast and move on to other work.

Computer-generated graphics can be a godsend for these purposes and for other types of business presentations. By converting quantifiable data into charts, graphs and other visual forms, a computer can provide nearly instant comprehension of perspectives and relationships.

Many pages of paper with row after row and column after column of data, which might take more time and more inclination than a decision-maker has for digging out what he wants to know, become recognizable at a glance. Highlights pop into view and significant variations call attention to themselves. For the preparer

of the presentation, the result is an easier job of selling the product to a customer, or "selling" a proposal to the boss or the board of directors.

Like automated data processing, computer graphics used to be an esoteric function. Experts tended to it behind a no trespassing sign, and only well-heeled companies and institutions could afford it. Also like data processing, and trailing just behind it in development time, graphics is now descending into small workplaces.

The wider accessibility of graphics is made possible by today's personal-computer systems. Small businesses use them as the stand-alone equivalent of the mainframe computers in big business. Even companies of mainframe size are increasingly purchasing personal computers for managers and non-dp specialists to use, because they provide access to information in the main data base and permit each user to work with computing independently.

Big business or small, whether stand-alone or plugged into a distributed network, personal computers are capable of producing good graphics when the right peripherals and software are in place. Independent peripheral manufacturers and software houses have stepped in to provide programmed or programmable graphics for machines that don't have the ability built in.

Several of the leading original-equipment makers have recently introduced small-business models with graphics either integrated or available as an off-the-shelf option, and all have made the function as friendly as possible to the user. If you

know how to operate the machine, you'll soon know how to generate presentation-quality graphics.

Counseling with computers

Frank Doe acquired DSS/F for the Apple II Plus used by his company, Manna Financial Planning, in Fairfax, Va. Doe himself is highly numerate—he's a certified financial planner—but he has a lot of clients who aren't. Doe counsels people on tax and investment decisions, and he says the impact of converting the numbers into pictures is "fantastic."

"I've put a 'tax thermometer' into the computer," Doe says. "I can key in the client's tax bracket and various investments under consideration, and an indicator will move up and down on the monitor screen to show the effect on disposable income. You can see the client's head moving up and down with awe as the meaning of all the numbers finally sinks in."

Doe frequently uses the system to present "fast facts" to a client, such as graphically showing the results of starting a retirement fund or a child's college-education fund, for the present year or in a given future year. He has stored the progressive steps of the five-year federal tax-reduction program into memory, as the steps relate to individual financial decisions.

The computer with DSS/F is a persuasive presenter, Doe says. One of his clients was a man about to be divorced, who didn't especially look forward to an upcoming discussion about alimony with his wife's lawyer. Doe printed out a graphic financial profile of his client, highlighting the

key numbers showing what seemed to be an equitable level of monthly alimony, and went along on the visit to the lawyer's office. "The lawyer studied the charts and said, 'Well, that's plain enough to see.' It was all over in less than 10 minutes," Doe states.

With the formats in storage, Doe is able to create completely customized "slide presentations"—the display actually used for this purpose is a normal TV screen—that show a client exactly where he stands financially and what could be gained or lost by certain courses of action. "It's his picture," Doe says. Displays can be moved forward or backward at will, as with a slide projector, and Doe has, in effect, incorporated a carousel on diskette, plus the option of printing hard copies at any time.

Sophisticated graphics

James E. George, a consultant based in Los Alamos, N.M., has played a leading part in bringing sophisticated graphics within the reach of personal-computer users. In association with Integrated Software Systems (ISSCO) of San Diego, he helped develop two of the most powerful graphics software packages now in use on mainframes. Each package costs more than the price of an entire, elaborate personal-computer system.

George personally uses an Apple II as a versatile tool in his consulting and teaching work. He has devised software for himself and others that permits an Apple to serve as an intelligent work station for a mainframe running the ISSCO packages, and has developed other software to enhance the graphics capacity of a stand-alone Apple.

"To me, the power of the personal computer is its flexibility," George says. "One moment it's a financial wizard with VisiCalc. Then it becomes a word processor with a spelling checker. Then it helps you create charts and viewgraphs on your own, or becomes an intelligent graphic

work station, communicating with larger host computers but saving the resulting graphics for future use.

"Just as personal computers should not be ignored by host application software, the richness of the software and applications available on hosts should not be dismissed by personal-computer users who could have the benefit of that access."

The early development of computer graphics, George says, was characterized by poor image output quality, and the need for users to be technically knowledgeable and fluent in computer languages. But graphics systems are finally attaining the goal most other systems reached some time ago: availability to the end-user. The promise of graphics is being realized by today's combination of high-quality output, simplified use and inexpensive hardware.

"Computer graphics are useful to any organization that finds sheets of computer printout a cumbersome and ineffective means of understanding data," George says. "Graphics are also useful to those accustomed to the time-consuming process of having rough sketches rendered into presentation quality by graphic artists. The manual method has other drawbacks, too. Limited time and facilities often restrict an artist to the most elementary devices, such as different kinds of lines and shading. A person with little expertise in graphical data representation must also be able to experiment with various types of graphs to see which would create the desired impression.

"When the graphics are computerized, you can quickly and economically experiment with techniques for presenting information. A correctly chosen graph becomes a powerful tool for presentation and persuasion," says George.

In George's opinion, computer graphics has more nearly reached maturity as an aid in management decision making than for any other

application, including the scientific uses that have received much attention.

"The computer's information-handling capacities are now being complemented by the ability of hardware and software systems to condense, code and display information in graphic forms, making large amounts of data comprehensible," George says. "As a result, managers can base their plans, decisions and actions on information that's more complete and more timely than it was before computer graphics. Graphs are communication devices used by managers to help each other confront problems and explore solutions. Along with techniques such as modeling and simulation, they expand the range of actions open to an organization's leaders."

Making connections

George generates his own presentations for clients, students and at workshops with his Apple II, a Qume printer and a Houston Instrument Hiplot plotter.

When he dials into a mainframe computer to implement software as a consultant, for example, George makes the connection with a 1200-baud modem and the TEKA-LIKE software that his company, Mesa Graphics, now markets to other Apple users who have access to mainframes.

TEKALIKE, as the name implies, turns the Apple II into an intelligent work station for graphics that emulates the Tektronix 4010-series terminals. A host computer's graphical data, intended for the 4010, is diverted to the Apple's screen and can be saved in its memory or on disk, for manipulation of scale and plotting on the screen or plotter.

For a stand-alone Apple, Mesa Graphics has two packages developed by George. The first is SOFTCHAR, a "subroutine library." A user having standard Applegraphics and pro-

gramming ability in the Pascal language can color, rotate and scale plots on the screen or on the plotter for printout. The resulting graphic can be dropped into a space left open on a page of a presentation prepared by word processing.

VUGRAPHS, Mesa's second package, requires no knowledge of programming. Using simple commands, the user can create displays composed of words in a choice of several typefaces that can be italicized, colored, rotated and scaled. Rectangles and lines can also be created, and can be adjusted for line thickness. Both packages require a 48k Apple, one disk drive and Applegraphics with Pascal.

Earning attention

The Apple II usually first earns the attention of third-party producers of software, plotters and various kinds of gadgetry dedicated to graphics creation. The parallel interface card

called The Grappler, marketed by Orange Micro, is one example. It contains its own chip, enabling graphics from an Apple's screen to be dumped to any of several printer models without the need to load software routines.

Another approach to graphics upgrading is the combination of hard-

ware and software from Maxtek, which is available to users of the TRS-80 Model II, the Superbrain personal computer and the Heath/Zenith Model 89. Maxtek's XCEL Graphics Unit hardware, when retrofitted to one of those models with 64k of RAM, gives the computer a black-and-white screen resolution of 512 pixels (picture elements) horizontally and 240 vertically. That comes to 122,880 bits of information defining the displayed image. Each pixel's on-off state is determined by a bit in the auxiliary unit's own 16k RAM.

You don't have to program all

"Computer graphics are useful to any organization that finds sheets of computer printout a cumbersome and ineffective means of understanding data."

ware and software from Maxtek, which is available to users of the TRS-80 Model II, the Superbrain personal computer and the Heath/Zenith Model 89. Maxtek's XCEL Graphics Unit hardware, when retrofitted to one of those models with 64k

those pixels yourself. Maxtek has five complementary software packages, at a per-package cost. One generates lines, circles and other primary shapes with 90 degree rotation; another is a set of subroutines to display relationships between two sets of data

Choosing the right chart

You don't have to be an expert to create graphics with a computer these days, just as it's no longer necessary to be a programmer to generate data. But a poorly chosen or designed graphic will confuse the viewers of your presentation just as surely as incorrect figures or ambiguous words would.

To help beginners get a quick handle on the important aspects of effective graphic design, ISSCO has published a 40-page guidebook called *Choosing the Right Chart*. It was originally compiled as support for large-computer software packages, but the principles are universal. ISSCO will send a copy to anyone for \$8.50. More information can be obtained from ISSCO, 4186 Sorrento Valley Blvd., San Diego, CA 92121.

To avoid false starts with the choice of possible charts, first write a "focus sentence" summarizing what you are looking for or what you want to show.

Typically, the message you plan to convey with a chart will be in one of four primary categories of patterns or relationships: a time series, to show changes in quantities over a period of time; parts in relation to a whole (percentages); comparisons between items or places, such as expressing sales figures by product line or market territory; and the relationship between two variables, such as tracking sales per employee against sales expenses per employee. The basic tools at your disposal are the pie chart, the curve, progression of steps, the bar (horizontal) or column (vertical) chart and the geographic map.

The following guidelines should be followed to make your graphics as persuasive as possible:

- When converting data to a visual image, it's usually best to be selective and include only the necessary points. An overly "busy" chart loses impact.

- To help guide the viewer's eye, make axis numbers large enough to read easily; a 0-5-10 progression with tick marks between will work just as well as small numerals through 10.

- Label curves within the chart when possible, rather than footnoting them, and make the curves thicker than the lines on a background grid.

- Use identical scales for each of the subjects in a comparison. If sales go to 100 in one market and to only 50 in another, it's best to run the coordinates up to 100 or more in both representations.

- Limit pie charts to no more than five segments.

- Whether working in color or black and white, order the shade patterns from darkest to lightest (from the bottom in a column chart; from the left on a bar chart), and avoid garishness in the use of stripes, dots and other shading effects.



Fill this space with a GRAFTRAX graphic
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We're looking for the Picasso of programming. So we drew up an art contest for people who don't know a painting pallet from a PROM.

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All entries will be judged on originality, creativity and best use of computer equipment. They must be postmarked no later than May 1, 1982, and be accompanied by the software program, so we can recreate the winning entries for verification. Make sure the graphic is no larger than 8" x 10" and no smaller than 4" x 6". And remember, if you digitize art or a photograph, it must have been originally created by you.

So get busy and enter.
You might be a winner.

And your software
could be your "soft-
wear."



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EPSON "SOFTWARE" SWEEPSTAKES RULES

- 1) Any computer equipment may be used to format the entry, but the graphics output must have been printed on an Epson MX-70, MX-80, MX-80 F/T or MX-100 printer with either built-in or optional GRAFTRAX. Winning entries will be created by Epson for verification.
- 2) Each entry must be accompanied by the software program used to create it. All entries and software and the rights to use them become the property of Epson America, Inc.
- 3) All entries must be at least 6"x4" and no larger than 8"x10" in size.
- 4) Art or photographs, if used, must have been created by the entrant.
- 5) All entries will be judged by an independent panel of judges on their creative merit, originality and best use of computer equipment. Decision of the judges is final.
- 6) This contest is valid from January 1, 1982 until May 1, 1982. Entries must be postmarked no later than May 1, 1982.
- 7) Participation in the Epson "Software" Sweepstakes is open to any except the following: employees of Epson America, Inc., its service agencies, or their families.
- 8) Winners will be notified by mail no later than June 1, 1982. A list of winners will be made available by sending a stamped, self-addressed envelope to Epson America, Inc., 3415 Kashiwa Street, Torrance, CA 90505.
- 9) Entries will be maintained on file at Epson America, Inc. until January 1, 1983.
- 10) Prizes are as follows: First prize includes round-trip economy air transportation for two to Tokyo, from the airport nearest the winner's place of residence, and six nights standard hotel accommodations, double occupancy. Trip does not include airport departure taxes, hotel service charges, cost of transportation or other expenses incurred before leaving the airport of initial departure, returning to Tokyo airport and returning home from the airport of initial departure; nor does it include meals or gratuities. Second prize consists of one Epson MX-100 Printer. Third prize consists of his and hers Seiko Quartz Watches. Additional prizes include 25 Micro-Nine Printheads, 50 Epson Digital Watches, and 100 Epson Ribbon Cartridges.
- 11) You may enter more than once, but each entry must be accompanied by the official entry coupon below.
- 12) Void where prohibited by law.

Attach this form firmly to the back of each graphic you enter.

NAME _____

STREET _____

CITY _____

STATE _____ ZIP _____

PHONE (____) _____

COMPUTER EQUIPMENT USED _____

PRINTER MODEL AND SERIAL NUMBER _____

T-SHIRT SIZE _____ S _____ M _____ L _____ XL

Mail entries to:

"SOFTWARE" SWEEPSTAKES
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PROFESSIONAL COMPUTING

in several possible graph formats; there are surface plotter subroutines to display curved surfaces in true perspective with or without the removal of "hidden" lines; a 3-D generator constructs and manipulates points and wire-frame shapes to give the viewer the perspective of three dimensions; and the fifth program, like Jim George's TEKALIKE, emulates the Tektronix 4010 series.

Devices such as The Grappler, and even Maxtek's combination package, are general-purpose devices—they don't direct the user in a specific application. Some of the new developments in personal-computer graphics are in software aimed at helping the business manager quickly reduce numbers to an image someone else can easily understand.

Picking up

Personal Software, whose VisiCalc program is compatible with many machines, has followed with two packages (again, only for the Apple at the start) that graphically pick up where VisiCalc leaves off.

VisiPlot software permits the non-programmer to generate high-resolution graphs and charts, in up to six formats and colors, from data entered on the spot or downloaded from VisiCalc. The VisiTrend package goes one step further, establishing a "time series" according to any or all of several temporal coordinates and expressing the result in tabular or graphic form. This capability can be handy if your audience is not well skilled in multiple linear regression (forecasting) and the more subtle aspects of leads, lags and moving averages.

Another software package available is Addison-Wesley's Micro-DDS/Finance package, used by Frank Doe. Financial modeling and graphics are inseparable in this relatively expensive package, (\$1500 list), requiring a minimum of a 48k Apple II with Pascal, two disk drives,

a choice of black-and-white or color monitor, and, for hard-copy prints, an Apple Silentype printer. A version for Apple III is expected, with adaptations to other systems to follow.

Micro-DSS/Finance is designed primarily for financial managers and permits elaborate "what-if" manipulations of financial data. The features that make the package especially useful for presentations are its report generator and the built-in color graphics. Together with a compatible printer (currently the Anadex 9501, Qume, Epson MX100 and MX 80, IDS Paper Tiger 440 and several versions of the NEC Spinwriter), the package prepares letter-quality reports.

Pie charts, bar charts and line graphs can be generated one at a time by answering the menu questions. If the user builds a graph-specification file in the DSS/F editor, he can use the same set of charts with varying scenarios or as the visual equivalent of numeric formats for regularly updated data, such as monthly sales reports.

If the user is in a hurry, the answers to just five menu questions will prompt the package to scan the model and generate up to 100 "quick 'n' dirty" bar charts. A practiced user, says the package's publisher, can make a complex change in a report in 15 minutes, create a new format in five minutes or create a graph in three minutes. The package can also prepare a "slide presentation" of the same images to be shown on a monitor.

Capability and cost

Just about any personal computer now at work in a business environment is capable of generating and displaying graphic presentations if the right hardware and software accessories are at hand. Image quality and format flexibility depend on what's available for a given machine,

continued on page 84

Coming up in **PERSONAL COMPUTING**

March
Word-processing software

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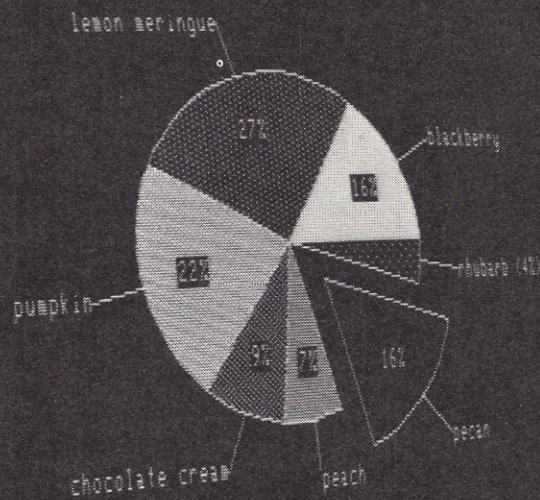
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MICROPROCESSOR(S)	Z-80A Central processor 8035 Auxiliary processor	8088 processor	6502A processor
GRAPHICS DISPLAY RESOLUTION	640x240 pixels	640x200 pixels	560x192 pixels
DUAL FLOPPY DISC CAPACITY	720K bytes	320K bytes	280K bytes
CONVENIENT DESKTOP PACKAGE*	Yes, all in one enclosure	No, 3 enclosures	No, 3 enclosures
BUSINESS GRAPHICS SOFTWARE INCLUDED?	Yes	No	No
CP/M COMPATIBLE?	Yes	Partial	No
LANGUAGES SUPPLIED BY MANUFACTURER	Graphics BASIC, PASCAL, COBOL, FORTRAN, C	BASIC, PASCAL	BASIC, PASCAL
APPLICATIONS S/W PACKAGES SUPPLIED BY MANUFACTURER	10 packages	5 packages	5 packages
SELF-TEST DIAGNOSTIC	Yes	Yes	No
NATIONAL ON SITE SERVICE	Yes	No	No
MANUFACTURER SUPPLIED PRINTERS	Letter quality/matrix (136 columns)	Matrix (80 columns)	Letter quality/matrix (80 columns)
RETAIL PRICE PER KILOBYTE OF DISK STORAGE	\$5.55	\$11.17	\$15.57

*Professional configuration: Dual Floppy Disks, Monochrome Display, Keyboard, CPU, 64K bytes (or minimum) RAM Memory, and Printer Interface.

Source: Dataquest and Manufacturer's Literature, November 1981.

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CIRCLE 14



PROFESSIONAL COMPUTING

Computers investigate that research rapidly, reliably

With more than 950 data bases in operation throughout the U.S. and Canada, a world of information is literally at your fingertips

A black and white photograph of a computer keyboard. A magnifying glass is positioned over the keyboard, focusing on the keys. The keys are light-colored with dark lettering. The magnifying glass has a dark handle and a metal rim. The background is slightly blurred, showing more of the keyboard and the surface it sits on.

If you're using a personal computer in your office for record keeping or accounting, and you think that's all it's good for, get ready to be enlightened. You could be using that very same computer to access information tailored to your specific business—information that might take you years to uncover using traditional methods, information residing in a vast, up-to-date data base.

Hundreds of data bases are available to personal-computer users. All you need to get into them is a telephone and your computer. Several data bases have been available to personal-computer users for years. Banks of information ranging from

medicine to law to farming are there for the taking. The problem has been that comparatively few personal-computer users have known about their existence.

There are many advantages inherent in the use of a data base, and users of mainframes and mini-computers have been enjoying these advantages for years. When these users need a piece of information—the date a particular piece of legislation passed the New Hampshire Senate, for instance—all they do is dial up the data base, spend a few minutes of computer time, and that information is in their hands.

There are data bases available for almost any subject, and the success of these computer-accessible information banks is evidenced by their ever increasing numbers. According to Cuadra Associates of Santa Monica, Calif., there are currently more than 950 on-line data bases in operation

throughout the U.S. and Canada. At least 95 percent of them are accessible by personal computers.

"Any computer that can act as a dumb terminal can get into these data bases," says a Cuadra spokesman. "There are some geographical limitations, but generally speaking, anyone who has a computer and is willing to pay the charge can use on-line service."

There are data bases available to users for an hourly charge. Others charge annual fees plus hourly rates. Still others require monthly membership fees, in addition to hourly charges. Each data-base production firm has its own way of doing business. If a firm can justify the cost, then on-line information is the way to go.

A few examples

COMMODITY provides commodities brokers with more than 5000 monthly, quarterly and annual time series of supply-and-demand data for coffee, sugar, rubber, copper and tin. It contains data on production, consumption, trade, stocks and prices for approximately 150 countries.

CANCERPROJ provides the cancer researcher with summaries of ongoing and recently completed cancer-research projects funded during the past three years. It includes both federally and privately funded grants and projects, as well as non-U.S. funded projects.

Professional financial-management firms can turn to MONEY MARKETS, which contains financial statistics, historical data, interest rates, debt-market activity, money supply and Federal Reserve activity derived from Federal Reserve and U.S. Department of Treasury reports.

Using the resource

One user taking advantage of data bases is John Roper, a Houston in-

vestor. "My father invested in the stock market the old way," he says. "I'm doing it my way and I like the results I'm getting."

Roper uses an Apple II to access the Dow Jones News Retrieval Service and to get up-to-the-minute quotations on about 40 stocks he holds in a portfolio. The service gives him the high and low price for each stock and gives the stock's closing price at the end of a particular day's trading.

"I guess I'm just basically lazy," Roper says. "If I had to go through the newspaper everyday to get the information I need, I wouldn't be nearly as successful as I've been using the computer." Having the information you need displayed on a screen in seconds is much easier than searching through and obtaining the same data from the small print in the newspaper.

"If you're involved in active trading and you're dealing with some stocks that need to be watched closely, you're going to be in and out of Dow Jones every day," Roper states. "When you're working with highly

and prints out a report for Roper to examine.

"All of this makes me feel like I've got an advantage over the other investors and brokers who are using the traditional methods," Roper says. "My father managed a lot of stocks and he only evaluated his portfolio once every quarter. I can evaluate mine once a day if I want to. What it all boils down to is this: I want to make money a little more quickly than my father did. To do that, I need current information and I need it in a hurry. With the Apple and Dow Jones, I've got what I need."

Doctor in the house

Other users who are putting computers to the test are doctors. A personal computer sitting in a physician's office is nothing new. What's being done with it today *is* new.

"Data-base access is keeping me up to date on new medical literature while saving me hours of poring over medical journals," says Dr. Ed Butler, a urologist with the Menlo Medical Clinic in Menlo Park, Calif.

"When you're working with highly volatile stocks, you've got to stay on top of the situation. I wouldn't feel on top without my computer and the data base."

volatile stocks, you've got to stay on top of the situation. I wouldn't feel on top without my computer and the data base."

As an added advantage, Roper uses Apple's Portfolio Evaluator package with the Dow Jones service. It allows him the luxury of sitting back and letting the computer do the legwork. It reads out the entire portfolio, recovers the current quotations, evaluates each individual stock

Using his Cromemco computer, Butler has been plugged into MEDLINE since July 1981.

As most doctors will tell you, getting through medical school is only the first step. A practicing physician needs to stay on top of new breakthroughs in the medical profession, particularly those breakthroughs that apply to his chosen field. Reading is the most practical way to accomplish that.

But where does the busy doctor find the time to read medical journals and get the latest information? The answer is simple: Find the right data base.

"When I want information on a given medical subject, I access MEDLINE, type in a few key words and I've got what I need on the screen in minutes," Butler says.

Actually, he doesn't dial MEDLINE directly. Like many others who've subscribed to the service over the past year, Butler goes indirectly through a service called Dialog (owned by Lockheed), which makes a monthly tape of MEDLINE's information bank and offers it to subscribers.

MEDLINE provides access to worldwide biomedical literature, including research, clinical practice, administration, policy and health-care services. It contains references to articles from 3000 journals published in the U.S. and in about 70 other countries, as well as chapters and articles from selected monographs.

"If I want to see what's being written on prostate cancer, I key in the words 'prostate' and 'cancer' and MEDLINE comes back with the number of recent articles available on each individual subject, and on the two as related subjects," Butler says. "Then I can ask it for a given number of titles. If I've got 10 titles and I'd like to explore three of them, I can ask for abstracts. The data base will give me a paragraph on what's contained in each article for which I've asked."

Some of these abstracts may contain material Butler would like to keep for his files. He can then print it out in his office or he can call Dialog and have the material printed and mailed to him in a few days.

"I'm interested in what other people have discovered regarding different aspects of medicine," Butler states. "MEDLINE gives me access

to a list of references and abstracts pertaining to the subject I want to explore. It's also proving to be a valuable tool to other specialists in the clinic, witnessed by my growing popularity around here."

On the farm

Another data base available to computer users is AGNET, used primarily in agribusiness. As *Personal*

ents and I'd get the results back in a couple of weeks. If someone wanted to sell me a more expensive ingredient, all he had to do was doctor the results. This way, I'm doing it myself and I'm getting my results back in just a few minutes."

The Schmidt farm has also benefited from AGNET's marketing information and charting service. A charting-assist program aids the farmer in watching the futures mar-

"The concept of a computerized information library is a modern phenomenon that's going to get bigger and bigger."

Computing has already reported (see "Cultivating by computer," *Personal Computing*, November 1981, page 38), AGNET was developed in 1975 by the staff at the University of Nebraska. The service offers a scientific approach to farming, taking much of the guesswork out of such activities as crop rotation, livestock trading and feeding procedures.

Gerald Schmidt, a Southern Nebraska farmer, has not changed his opinion of AGNET since November. "We spend an average of \$400 a year using AGNET, and believe me, it's money well spent. This service allows me to do things I could never do on my own."

FEED MIX, one of the AGNET programs, has simplified the care and feeding of Schmidt's cattle. He simply keys in current feed ingredients, and the program tells him how to build a balanced ration depending on the weight gain for which he's aiming.

"Before we got into AGNET, I went through the feed companies to get the proper mix," Schmidt says. "When I wanted a new mixture, I'd go down and give them the ingredi-

ket for a variety of commodities—in the Schmidt's case, cattle and soybeans.

AGNET also offers a variety of budgeting and purchasing programs to help the farmer decide on the feasibility of financing purchases or buying them outright. Additionally, it serves as a *Consumer Reports* for farmers, rating various pieces of farm equipment, recommending some and warning against others.

"Having this computer and being able to dial AGNET when needed makes all the difference in the world in running this farm," Schmidt states. "We're more efficient, we're more profitable and we worry a lot less."

Data-base business

Fred Bellomy is yet another user who takes advantage of data bases, and he can tell you everything you need to know about accessing them. He accesses about 300 of them with his DSC-2 computer.

Bellomy doesn't just use data bases to enhance his business. Data bases are his business. His firm, The Info-

continued on page 86

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Typewriter Interface

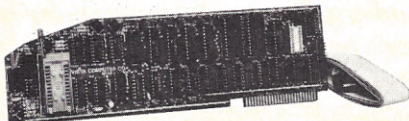
Apple to IBM Electronic 50, 60, 75 Typewriters Interface

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Suggested price

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PROM DEVELOPMENT SYSTEM[®]



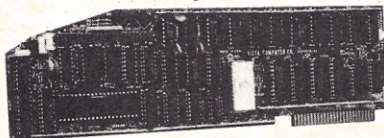
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- High speed DMA transfer of data (1 micro-second/byte)
- Complete documentation provided — includes theory of operation, source code for DOS enhancement utilities, schematics and diskette
- Uses all standard Apple DOS commands (OPEN, CATALOG, LOCK, DELETE, LOAD, etc.) except for INIT which has been improved and enhanced in a Vista format routine
- Compatible with Apple DOS 3.2/3.3, Pascal 1.1 and CPM 2.2 (with the Z80 soft card by Microsoft)
- 2K x 8 PROM contains Autoboot functions and all eight-inch floppy driver code allowing complete compatibility with Apple DOS 3.2/3.3

Suggested price

\$595.00

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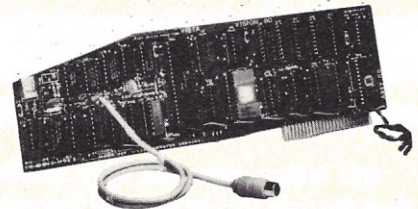
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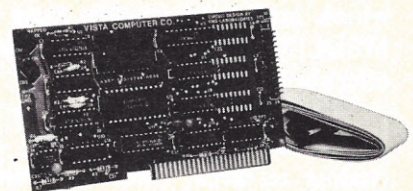


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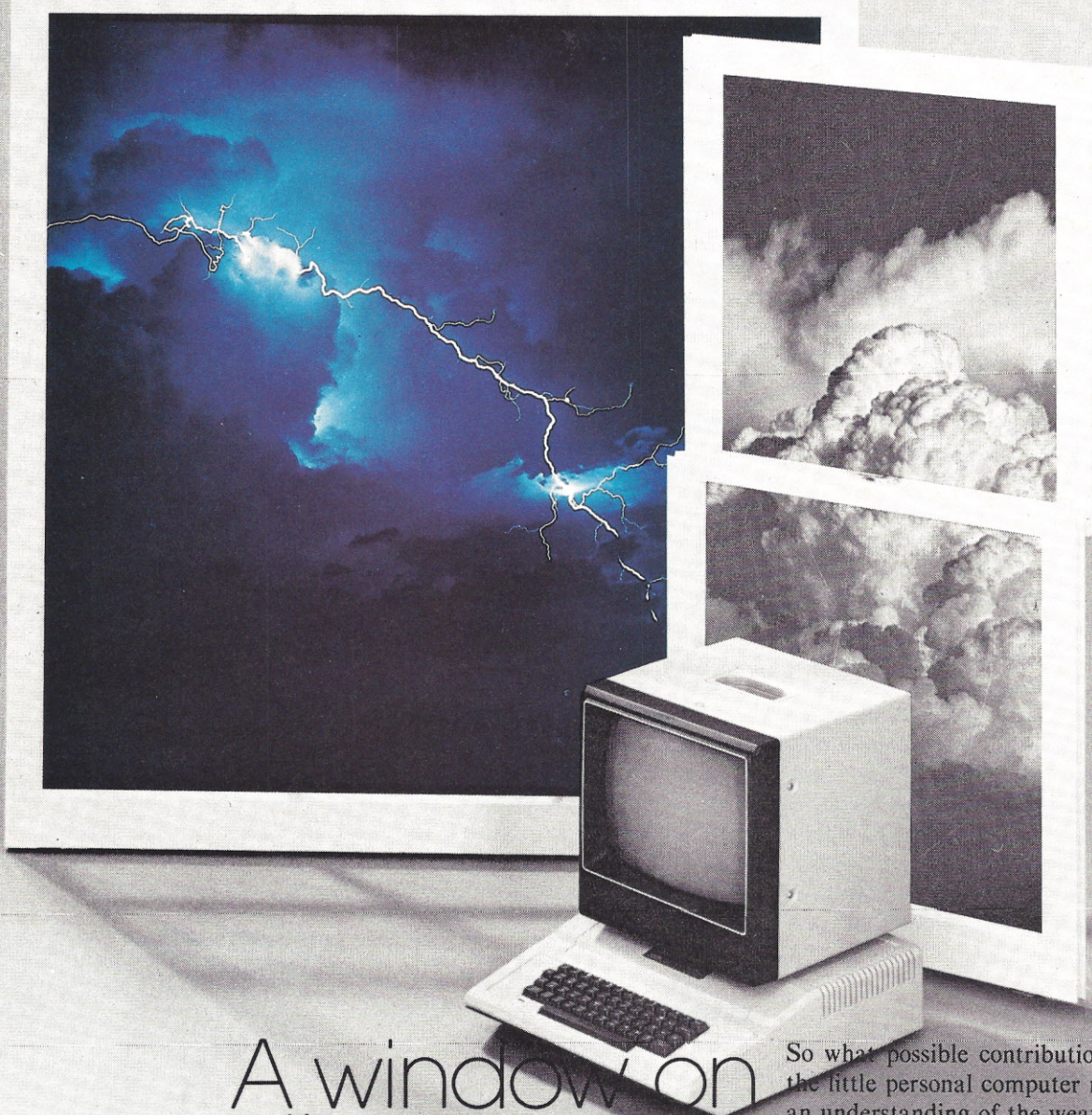
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PROFESSIONAL COMPUTING

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A window on the weather

Red sky at night, sailor's delight may still be true, but so is this: Personal computers are giving us "bread-and-butter meteorology"

Most meteorologists will concede that forecasting the weather past 48 hours entails little more than an educated guess. And, even with the help of the most sophisticated computers, these scientists can't hope to hit the mark every time.

So what possible contribution could the little personal computer make to an understanding of the weather?

Personal computers are just taking on importance in certain areas of meteorology. They aren't being used to spew out predictions of whether or not the weekend will be sunny.

Weather forecasting involves "too much data for a small computer to handle," explains a forecaster at Weather Services Corp., a Bedford, Mass.-based weather-forecasting center that prides itself on its highly sophisticated, scientific, computerized forecasting prowess. Like most modern weather-forecasting operations, Weather Services relies on very large computers to handle the huge and still growing data stream

PROFESSIONAL COMPUTING

required for weather forecasting. "If anything, the trend is to go for even larger computers," he adds, noting that nobody he knows in meteorology is using small computers, personal or otherwise.

Instead, personal computers are being used to help with some of the most difficult issues facing our society: Air pollution, hazardous-waste contamination, food production and other critical issues are greatly affected by weather, and are being addressed in part with personal computers.

Decisions concerning these critical issues are often made using inadequate weather data. Personal computers are just now being applied to help with weather-influenced decisions, which, like conventional management decisions, are data-based.

Problems such as dispersal of air pollution, rainfall, water-table levels and those concerning energy issues require solutions based on accurate, timely and detailed meteorological data. Personal computers, by managing those data and processing them in useful ways, are beginning to make a major contribution.

The big picture

Just as importantly, personal computers are being used by the researchers who study broad weather patterns, to learn more about atmospheric conditions. Personal computers reduce and isolate weather events to aid in understanding. That knowledge is then applied to weather data to help in making informed decisions that ultimately affect all our lives. It is "bread-and-butter meteorology," says one researcher pioneering the use of personal computers in meteorology.

In this field, a personal computer can simply be used as a smart terminal. Clients of large computer-data-based weather-forecasting operations generally have a local data terminal, which they use to retrieve data from the large weather data stream and to

tap into ongoing weather computations. A personal computer, acting as a smart terminal, can do everything a standard terminal does and more. How much more depends on research and software development that has only just begun. The American Meteorological Society has published little research on applying personal computers to weather studies. And at a recent national weather conference, only two papers were presented on applications for personal computers in the study of weather.

David Barber, assistant professor in the University of North Carolina's meteorology department at Raleigh, presented one of those papers. Barber asserts that "the small machines have significant applications in a number of [weather-related] areas."

Barber points to climatology as one area where personal computers are useful. Some climatologists, he reports, have been using the computers to track daily records of climatological conditions and produce monthly compilations. At least one climatology newsletter is produced that way. The computer, in this application, is mainly managing data.

Barber himself prefers to use the personal computer as a weather teaching tool. Using an Apple II with dual disk drives, graphics and a Paper Tiger printer, he is able to display daily weather patterns to his students. The data are displayed on the screen against the outline of a map of the local area. As weather conditions change, Barber can update the image on the screen and the class can see changes in actual weather patterns.

Barber, by switching weather variables, classes how weather conditions develop over different periods. While serious, detailed weather forecasting requires larger computers capable of handling much more detail, personal computers are perfect for Barber's small-scale use. He looks at only a small geographic area or examines only one aspect of the weather picture at a time.

"Personal computers let you quickly display data," notes Barber. "They provide moderate computational capability." Those aspects of the personal computer make it a valuable tool for data validation and quick verification as weather patterns develop.

Graphic capabilities are crucial to Barber's use of personal computers. The current limitations of the machines are in resolution of the graphics, storage capacity and speed of computation. "I can't plot multiple data on the screen," Barber complains. On his map, he may plot reports from several dozen weather stations, but if he tries to plot more than one piece of data—wind speed and temperature for example—the data overlap and are not usable.

Quick calculation

Barber would like to begin to use his personal computer in the computation of data not transmitted as part of the national weather data stream, but which can be calculated from those data. Dew point and rela-



PHOTO BY FREDERIC LEWIS INC.

tive humidity are functions of observed data that can be calculated easily, he suggests, with a personal computer.

Barber would also like to develop his personal computers to calculate weather variables in a regular grid of points, rather than at the weather stations. What is happening at the nearest metropolitan airport is not necessarily what is happening in the local community.

In short, Barber wants his personal computers to emulate what the large computers are doing in weather forecasting, but on a smaller scale. This is part of what he calls "the second computer revolution," in which personal computers are used to allow human interaction with the data stream.

The large computer system that Barber would like his small computers to emulate is the MCIDAS program (Man Computer Interactive Data Access System). The program, first developed by the Space Science and Engineering Center at the University of Wisconsin, is now widely

regarded in the world of weather forecasting. It allows large computers to receive signals from satellites constantly orbiting the earth and from conventional teletype data streams bringing weather information from around the country, explains Tom Whittaker, a computer and meteorology specialist at the University of Wisconsin.

People are "just scratching the surface" of what personal computers can do in meteorology, says Whittaker. He envisions some use of the small machines as terminals and as controllers of field and observation equipment. Whittaker also reports the increased use of small computers as teaching tools at the university.

"Personal computers can be highly selective in the data they extract," says Whittaker. Particular data, he says, can be taken out of the weather stream and analyzed using personal computers. The Apple computers used by the university's meteorology students haven't the speed or the memory for sophisticated modeling, but can be used to run program simulations of weather patterns.

The MCIDAS program, says Whittaker, can put data onto a grid in 15 seconds; his Apple takes more than an hour to do the same task. The huge amounts of data flowing into the MCIDAS program from all over the world would swamp a personal computer.

Whittaker says the smaller machines are more useful in teaching meteorology and in extracting small pieces of the available data. Without the small computers to control the printout of data, for instance, the school could be quickly buried in rolls of worldwide weather information and observations.

Personal computers are also being used to take weather information out of the data stream at the Massachusetts Institute of Technology. Researchers at MIT are using 16-bit personal computers mainly for their graphics capabilities, reports Robert

Thayer, systems programmer for the MIT meteorology department.

MIT makes rigorous demands on the computer to get the kind of graphics necessary. One graphic image alone requires about 250k of memory for MIT's purposes, Thayer explains. That means that one double-density floppy disk would contain all the information for only a single graphic.

Thayer prefers 1024 x 1024 resolution, and the new IBM Personal Computer, with 900 x 900 resolution, comes close to meeting his needs. The very small personal computers, like the TRS-80 or the Commodore PET, he points out, offer about half of that.

Particularly effective, he says, are the larger computers based on the S-100 bus. If you want to do the kind of weather work that he is doing at MIT, Thayer recommends a minimum of 128k memory and 16-bit processing. With the hard disk drives that are becoming available for personal computers, Thayer sees the machines becoming even more useful.

MIT researchers take data off the satellite and teletype transmissions and plot that information in graphic form. Thayer, along with others at the school, develops programs starting with the video manufacturer's base and then develops subroutines. Eventually, he hopes his efforts will result in a substantial weather-graphics-program library at MIT.

The key

Graphics are the key to understanding weather, Thayer believes. You can work with a model for weeks but then "take one look at the graphic and know it's wrong," he says. Graphics vastly increase the ability to understand weather modeling by comparing real data and following sequential developments—both crucial to forecasting and understanding weather.

Pennsylvania State University, which has some of the most extensive uses of personal computers for weath-



er applications, considers graphics to be very important. "There is a lot of mapping" in weather study, notes John Cahir, associate dean and professor of meteorology.

At the recent national Weather Association conference, Cahir presented a paper based on his work with a minicomputer. "We're just beginning to think of the small personal computers for downloading data," he says. Students will use the personal computers first as smart terminals and then try to emulate the large computer.

It will be a long time, however, before the really small computers take hold, Cahir says, because of their limitations in graphics capabilities, a problem already acknowledged at MIT. Still, Cahir's colleagues at Penn State are rapidly moving ahead with development of personal computing for isolated weather study.

"I doubt that personal computers will ever be useful in weather forecasting," says Penn State meteorology professor Alistair Fraser. "The machines are too small and too slow for conventional weather forecasting."

On the other hand, Fraser doesn't bother to apply the computer to the less important small weather applications, such as tracking snowfall or temperatures over a period of time. Those applications "are almost too trivial for a computer," he states. They can be done just as easily using a calculator.

Informal study

Fraser has his own HP-85 personal computer for small-scale modeling of isolated atmospheric events. Fraser might model something like the movement of a particular weather subsystem, such as the breakup of fog or the dispersal of pollution. (Dispersal of pollution was the subject of the only other research paper covering personal computers presented at the National Weather Association conference, Cahir recalls.)

Fraser develops his own programs by writing his own software and using commercial software such as VisiCalc. Each program is developed using standard weather-related differential equations.

Fraser may, for instance, study the ways sound travels through the atmo-

sphere under different conditions. None of his programs ever gets to the stage where it is polished and ready for public distribution. "I use the computer as a research and teaching tool for weather studies," he says.

The personal computer "is a good tool," says Fraser. It does nothing that he couldn't do before, but without it, he might not have bothered to proceed with certain studies. Now he might "try things out on a whim that would have become too complicated before," says Fraser.

He also prefers the control he has with the personal computer. With the school's large computers, he must always stay in touch with what the programmers are doing.

Fraser's requirements for a good weather computer reflect the generally recognized emphasis on graphics. "Every dot must be addressable," says Fraser. Ninety percent of all the data is dumped out in graphics, he estimates.

John Dutton, head of the Penn State meteorology department also uses an HP-85 for teaching and research. His computer work entails

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The weather data stream

When professional media weathermen think about computers, they think about the largest available computers, and not about small personal computers. The reason, they explain, is the huge amount of data that makes up the weather "data stream."

The weather data stream describes the flow of weather-related information from all over the world. It is a non-stop flow of information from many sources through a variety of media. Weather satellites transmit voluminous, detailed weather information, and weather stations worldwide constantly transmit weather data via telex or telephone transmission lines.

Weather Services Corp., in Bedford Mass., is one of the largest private weather organizations in the

country. Using four PDP-1134 computers, it receives continuous numeric weather information from the national weather service centers in Washington D.C. and Kansas City, as well from the World Meteorological Organization.

"Every six hours, weather stations around the world report in," says Weather Services operations manager Russ Christie. Almost every country in the world participates in making their weather data available, except for a few countries.

In addition, weather satellites provide visual weather data of the entire earth. "You must have a large computer to tap the satellite data," says Christie. At Weather Services, the weather data is stored and sorted so that it can be accessed by personal computers.

A personal computer can operate as a terminal of the large Weather Services computers and can retrieve a small portion of the total worldwide weather data that is being received. Using periods and dashes, simple graphics can also be achieved on a personal computer, and even better resolution is possible with some of the more sophisticated machines.

If the large computers at Bedford couldn't store and sort the weather data pouring in from worldwide sources, "you would end up continuously printing out a stream of data," states Christie. By combining the large computers with personal computers, people interested in weather can pull only the information they need from the weather data stream.

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MODE=NORMAL ORDER=R/O ROW=1-50 COL=1-20

ROW 1 (Net Sales) <--
ENTER COMMAND:

ROW	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Total	40 MATH:
---	---1---	---2---	---3---	---4---	---5---	41 ADD
1 Net Sales	1,000.0	1,100.0	1,210.0	1,331.0	4,641.0	42 SUBTRACT
2 Cost of Good	450.0	489.5	532.4	579.0	2,050.9	43 MULTIPLY
3 Gen & Admin	200.0	220.0	242.0	266.2	928.2	44 DIVIDE
4 Res & Develo	300.0	350.0	400.0	450.0	1,500.0	45 NEGATE
5 Total Costs	950.0	1,059.5	1,174.4	1,295.2	4,479.1	46 INVERSE
6 Gross Profit	50.0	40.5	35.6	35.8	161.9	47 INTEGER
7 % Profit	5.0	3.7	2.9	2.7	3.5	48 ROUND
8	0.0	0.0	0.0	0.0	0.0	49 CUMULATE
9	0.0	0.0	0.0	0.0	0.0	50 ABSOLUTE
10 % C.O.G.S.	45.0	44.5	44.0	43.5	0.0	51 ADD K
11	0.0	0.0	0.0	0.0	0.0	52 SUB K
12	0.0	0.0	0.0	0.0	0.0	53 MULT K
13	0.0	0.0	0.0	0.0	0.0	54 DIV K
14	0.0	0.0	0.0	0.0	0.0	55 SUM
15	0.0	0.0	0.0	0.0	0.0	56 GET
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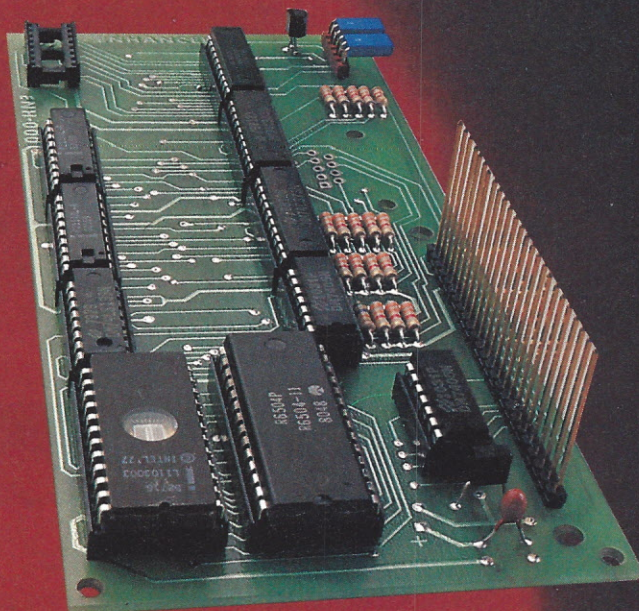
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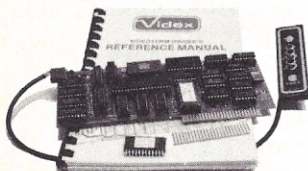
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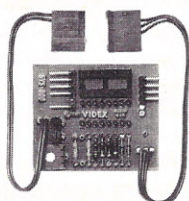
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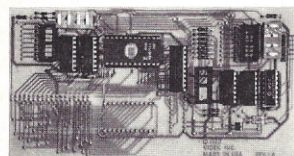
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COMPUTING CONSIDERATIONS

Technology shock is manageable

Any new experience that breaks from former practices and procedures can be initially frustrating. But this need not be the case

Editor's note: In the hectic course of modern life we often begin to function as though we were on automatic pilot, barely thinking about what we're doing.

Computing Considerations is a monthly feature that has been designed to keep you conscious-when-computing, to make you think about what you're doing and what is happening to you while you're doing it.

So in this article we went to the experts to find out what it is that is happening to you when you experience frustration-when-computing, and to offer you tips on how to avoid this frustration.

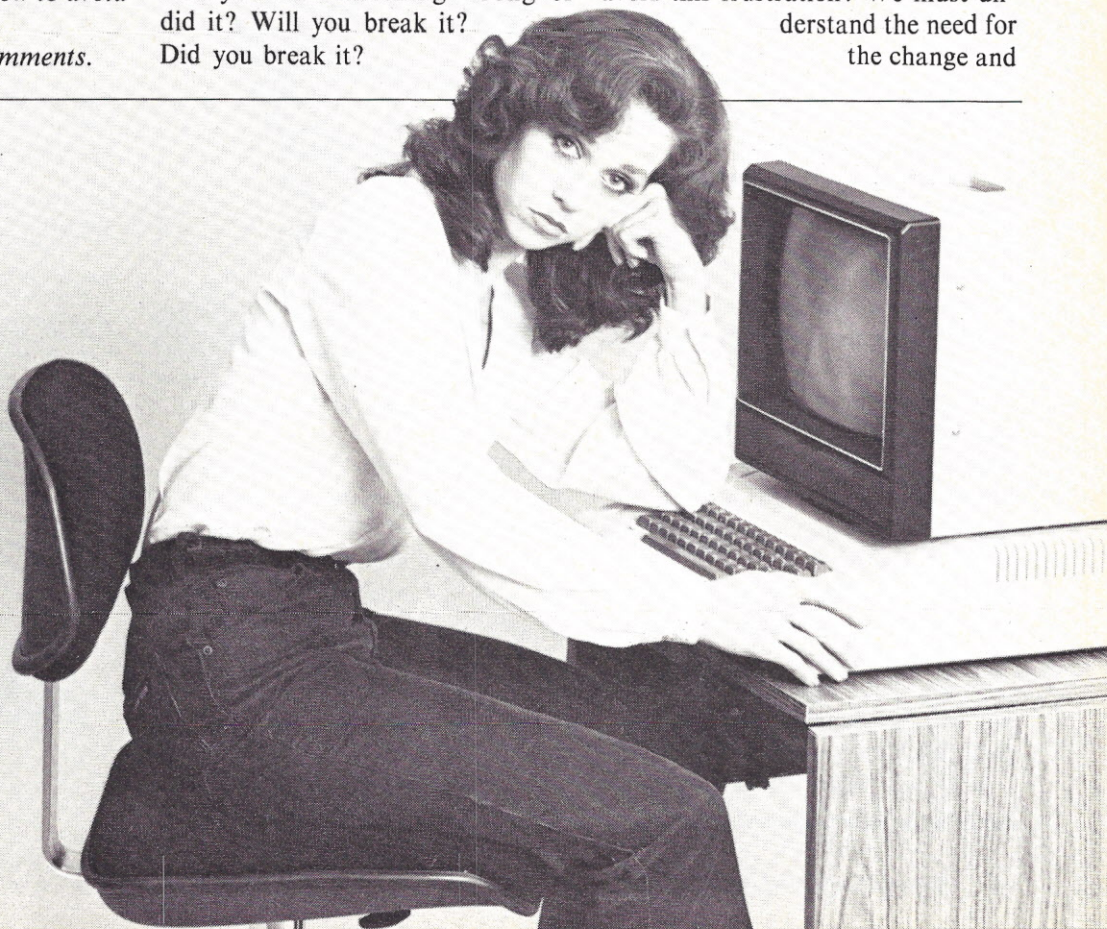
We welcome reader comments.

There's no question about it: The rise in use of personal computers can add great impetus to the antacid market. And although relief is just a swallow away, there are other, non-medicinal preventative measures we can take to reduce the frustration associated with computer usage.

And the frustration is there in many guises—in resistance to new technology, the initial interaction with the machines, in buying the computer, in knowing what to look for and what to do if it stops working. Did you do something wrong or did it? Will you break it? Did you break it?

Psychologists say that the frustration involved in computer usage is related to stress and resistance to change. When people are frustrated, they feel aggravated, helpless, anxious or negative. Most humans try to avoid situations in which they feel this way, and this avoidance reaction is normal and natural. In fact, it serves a self-protective function. Feelings of frustration can make us experience stress symptoms. So we defend ourselves by resisting situations in which we might be stressed.

How can we, as computer users, avoid this frustration? We must understand the need for the change and



COMPUTING CONSIDERATIONS

the benefits that will be derived from it—not only for our companies but for ourselves as well—benefits in terms of better decision making, time savings, job security, keeping up with the times and knowing that we are on the cutting edge.

Human beings have a tendency to fill information gaps with their own fantasies and misconceptions. Those who are using personal computing must get information that reduces uncertainty and clears up misconceptions. These misconceptions can include, "We'll break the machine. It will put us out of a job. We aren't smart enough to learn a new language at this point in life. We'll lose information," and so on. We need to eliminate these misconceptions and get a clear idea of what the change involves.

Finally people have problems when they think that they are unable to implement a change. This frustration can be avoided by knowing in advance what skills and knowledge are needed, along with the required ongoing support, training and technical assistance. And, perhaps most importantly, *people need to allow an initial period of inefficiency to legitimize their learning time.*

Anyone engaging in personal computing should do an initial cost/benefit analysis. This will answer questions like, "Why should I engage in personal computing," and "Why should I put up with the attendant frustration?"

We must be convinced that we want to do this, and that it is not too difficult. It helps to have personal computing appear as familiar as possible—by using role models, for example. To know that John Jones is using personal computing and John Jones is just like me or to know that Company Y is personal-computerized, and Company Y is just like mine, make it seem more plausible for me to do it as well.

It is only when a new experience

conflicts with former needs, beliefs and values that we run into trouble. So we need to understand what people need and value and believe.

Managers, beware

Managers in particular must realize that their people will shy away from computing if they perceive the change as too risky—a feeling that results from a threat to a person's ego. Managers must allow for face-saving. They must feel that mistakes are OK. They must understand that employees are not going to be perfect, but that they will be learning as they go along.

According to Dr. Evan Peelle, an organizational psychologist in Ann Arbor, Mich., frustration may set in if a person sees personal computing as a reduction in job status. "Computing is a job that has tradi-



Dr. Peelle: "Managers must become the success models for their workers."

tionally been in the realm of a person in a lower position, like a secretary or a clerical worker. But computing is in fact a high-status activity, and very much on the cutting edge. In many organizational instances, it is also very important to have the workers who will use the computer involved in the decision to get a computer, or given a say in the choice of computer. It is of utmost importance that people

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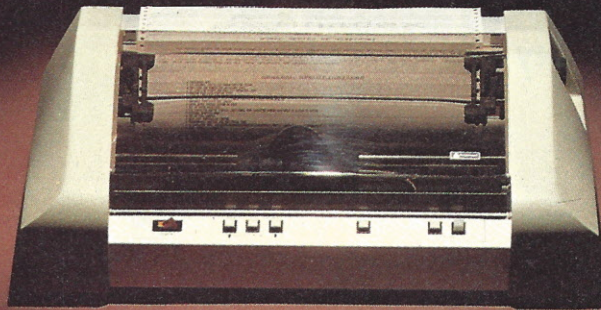
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The full standard ASCII 96 character set, with descenders and underlining of all upper and lower case letters, is printed bi-directionally, with up to 5 crisp copies, at speeds up to 200 CPS. Models DP-9500 and DP-9501 offer 132/158/176 and 132/165/198/220 columns respectively. Print densities are switch- or data-source selectable from 10 to 16.7 characters/inch. All characters can be printed double-width under communications command.

Interface Plus

Standard in all models are the three ASCII compatible interfaces (Parallel, RS-232-C, and Current Loop). Also standard is a sophisticated communications interface to control Vertical Spacing, Form Length and Width, Skip-Over Perforation, Auto Line Feed, X-On/Off, and full point-to-point communications.

Features Plus

As standard, each model features forms width adjustment from 1.75 to 15.6 inches, shortest-distance sensing, full self-test, 700 character FIFO buffer (with an additional 2048 characters, optional), and a quick-change, 6 million character life ribbon.

Quality Plus

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The efficient new servant comes home

Why waste those precious free moments with domestic chores, drudgery or concern for security?

Let us introduce a live-in domestic servant whose name is Fred. A genial sort who has become more or less a part of the furniture in a house in Arlington, Va., Fred is limited in his abilities and doesn't do windows or make beds. But what he does, he does tirelessly, reliably and without complaint, which is a good thing because the lord of the house has some tyrannical tendencies.

Each time his employer comes home and shouts out, "Fred, we're back," Fred cheerfully replies: "Glad to see you again, sir." Fred stands ready at all times to make the master's life easier by performing a lot of simple tasks, such as turning one light off and another on, switching the TV set on at the right time for the evening news and then switching it off when the boss asks him to start up the stereo instead. Fred brews morning coffee, wakes the boss up, and doesn't mind trying again 10 minutes later if the boss is too sleepy at first. Fred is used to being asked throughout the day to tell the time. True to his calling, he never speaks until spoken to, agrees with his boss's politics, and flatters the boss.

If you suspect by now that Fred is a talking computer with some remarkable abilities, instead of a rather humble human servant, you're right. Fred and his real-life creator and master, an electronics professional named Reuel Launey, have the kind of comfortable and effortless home life that has been portrayed in many science-fiction stories.

A computer that controls and monitors the apparatus of a home doesn't have to be able to talk as Fred does. But some people, like Reuel Launey, enjoy the vocal give-and-take to entering commands through a keyboard or remote keypad.

The possible applications and configurations of computerized home control are as diverse as homes themselves—in layout, the appliances present, degree of security needed, and the interest and skill of the residents in creating a system that meets their unique purposes.

Anyone with a strong aptitude for electronics (or with access to the expertise of others) can nearly achieve the security of a fireproof, intruder-proof fortress, plus the comfort of a house outfitted with a system that conducts much of the housekeeping.

But even an average householder of no particular sophistication in electronics can put together a less complex system, also based on a personal computer, that will give a previously unknown degree of security and daily convenience.

In the beginning

The idea of using a personal computer for control in the home has a curious history, which is just beginning to come full circle. When the first computers that an individual could afford were introduced around 1976, it was widely expected that the control possibilities would provide the first entry to a mass market. Indeed, many, if not most, of the early buyers were electronically inclined tinkerers who enjoyed putting a computer through its paces to operate the toaster or the garage door. But the tinkering took more time and ability than most people could afford, and the hobby-oriented users hardly constituted a mass market.

Meanwhile, personal computers have found a rapidly growing market for video games, easier record-keeping and other financial functions, self-teaching, and a variety of



other useful and enjoyable applications in the home. Many users, especially those who have gotten over the novelty of games but have been pleased to discover how versatile a computer is, have explored new ways to get practical value from the computer. With a moderate amount of money and time, the homeowner can electronically connect his computer to all sorts of devices to make the house safer and more comfortable.

The house of Tom Jefferson in Burnsville, Minn., is a home-control showcase. Jefferson is a supervisor of quality in the Data Communications Network of Republic Airlines. Though he had no experience in programming, his work led to an interest in personal computing, and he bought an Apple II Plus for his home.

Not just a toy

Jefferson has three young sons, so it's not surprising that game cassettes provided the first use of the computer. But Jefferson was determined from the beginning that the computer wasn't to be a toy. He taught the boys some programming techniques, and he has a standing rule that before any games session, each child must spend

at least a half-hour to devise a simple program—creating graphics or an arithmetic game, for example—and then demonstrate the program and explain how it was created.

With his own new programming ability, plus the requisite peripheral equipment and enhancements to his 64k Apple, Jefferson has devised a set of five programs that put an extraordinary degree of control over the house at his fingertips.

One program enables Jefferson or his wife to switch lights on and off in any room from any other room. The computer's real-time clock not only turns on certain lights at wake-up time, but also permits perpetual automatic on-and-off scheduling of lighting.

A second program commands appliances, such as the TV and stereo, and a toaster is also timed for the family's wake-up. Computer-monitored sensors, placed strategically in doors and windows, will sound an alarm if there is an intrusion, and if the family is away the computer will automatically phone in the alarm to the police. A third program also uses sensors, to monitor and control temperature, for savings

on heating and air conditioning costs.

Those applications are straightforward enough, but Jefferson let his imagination run free in a program he simply calls "Moods." With a few keystrokes, Jefferson can create any of 10 home atmospheres by setting a combination of appliances into action or inaction.

For example, the program's mood 1 is the "Saturday Night Mood." The kids are in bed, and mom and dad are in the mood for a relaxed evening. The computer automatically dims the living room lights, and continually turns the TV on and off at preset times for the Jeffersons' favorite programs. It also turns the stereo on between TV programs. Alternatively, via a subroutine, the computer will prompt music for up to two hours from a sequence of cassette and reel-to-reel tapes.

Then there is the "Company Calling" mood. At the appointed time the computer will turn lights on or off in each room, turn the TV off and the stereo on, and start the coffee brewing. If the Jeffersons want to show slides, the computer, with another subroutine, will automatically lower a screen from the ceiling and



control the advance of slides.

And the fifth control program? Every visitor naturally wants to know how these electronic wonders came about. So Jefferson inserts his "demo" disk, and at either the TV set or one of Jefferson's two monitors, the guest can watch the computer introduce itself ("My name is Alpha.") and then give an easily understandable explanation of how a computer works and a show-and-tell demonstration of the home-control system.

Jefferson also subscribes to The Source to link his computer by telephone to a wide variety of current information, and the computer is used weekly by his wife to run the "marketing" program Jefferson wrote. By measuring kitchen-and-pantry inventory against the data that Mrs. Jefferson enters on recent consumption, the computer can literally print out a shopping list, along with the price of each item at the supermarket she uses most often. That program also helps to monitor the family budget, Jefferson says.

Spreading the word

Despite the elegance and seeming complexity of his set-up, Jefferson

says the time and effort required have not been a burden; he spends about an hour a day at the computer mainly to update data and work on new programs.

"I've become an evangelist for personal computers," Jefferson says. "Our computer has been exceptionally beneficial to my family, and I think it's just a matter of time—five years or so—before almost every home will have computing power of some kind, either a personal computer at home or at least access to outside computers via a terminal."

Other than the imaginative homebrew software, Jefferson put his control system together standard with Apple peripherals, components such as the sensors, and plug-in relay modules for each controlled appliance, which are widely available and easily installed.

But the interface hardware makes the computer the boss of the switches. The BSR X-10 Controller (marketed by Radio Shack and Sears under their own names as well as by the maker, BSR) is the link that brings the whole system together. Together with an interface specific to almost any brand of personal computer, in-

stalling an X-10 would cost \$100 at most and would enable the computer to command as many as 16 appliances. Optional extras in the BSR system include a timer, a manual remote keypad and a recently introduced responder that enables an away-from-home user to command the X-10 through the telephone.

An important plus of the X-10 system is that it does away with multiple trails of wires from appliances to the input/output ports of the computer. (It signals controlled devices through the installed house wiring.) That advantage was the "dynamic breakthrough" that first got Tom Jefferson interested in the possibilities of home control. He predicts that the popularity of control functions will grow quickly when more personal computer users become aware that it's no longer necessary to do a lot of wiring and experimenting to obtain a functioning system.

Knowing the rules

What are the guidelines to follow in planning a control set-up? Mark Lambert is well qualified to answer, having done this planning recently at two homes, before and after a move

from Los Angeles to Sanford, Fla. Further, he is a computer professional, formerly in R & D at Northrop Corp., and now a personal-computer applications specialist with Martin-Marietta Aerospace in Orlando. Further still, by virtue of being an inveterate bargain-hunter and self-confessed scrounger, he has had the ingenuity to piece together a home-control system, including the computer itself, for less than \$1000.

The goals that should be common to all homes and all users, Lambert believes, are these:

- A system should be automatic, able to run indefinitely without requiring attention unless the operator wants to alter it.
- Its configuration and input parameters (date, time, temperature, sequencing, and so on) should be adaptable, and it should be flexible in the devices to which it can output. Manual overrides of automatic processes are highly desirable. Ease of use and "friendliness," such as user prompts, are important if the system is to be used by children or others less knowledgeable than the person setting up the system.

And the system *must* be reliably free of electronic glitches. "There's only one thing worse than an alarm system that gives false alarms," says Lambert. "That's an alarm that does nothing when the burglar comes in."

At his own new home, Lambert has computer control of lamps in three rooms, TV and stereo, an outside floodlight, and a security system connected to an alarm in the master bedroom. The basis of the "viable, stand-alone computer system" which he has painstakingly assembled is a Micro-DaSys single-board computer with a 6802-chip central-processing unit. It has 16k of random-access memory, and a custom-built input/output controller card. Lambert's rig uses cables connected to devices the old-fashioned way, an approach that he says has no cosmetic drawbacks if a homeowner (or, especially, a renter) can use moldings or carpet edges.

Lambert's system, in accordance with his universal design criteria, runs automatically by a clock that turns over at midnight. The changing seasons are no problem for the lights, because sensors tell the CPU about the rising and setting of the sun. The system is highly adaptable because inputs and outputs are interrelated by modifiable software rather than

simplicity, of a working control set-up.

But the computer business has been through this before with a lot of other applications: When hardware technology steps fast ahead of the software to fuel it, expert programmers emerge to close the gap for less expert users. That is on the horizon now for home-control applications,

"Versatility of control functions is assured by the mere fact that they are guided by computer."

hardware pieces, which would have to be discarded or expanded according to changing needs.

"Versatility of control functions is assured by the mere fact that they are guided by computer," Lambert says. "Any type of sensor or control device can be interfaced. Sensors are obtainable to measure almost anything: temperature, pressure, vibration, voltage—you name the parameter and a computer is the best if not the only way to measure, display, correlate and evaluate it."

Catching the fever

Not everyone could bring Lambert's professional expertise or Tom Jefferson's aptitude to the task. But Lambert believes that the do-it-yourself approach to configuration "shouldn't be difficult to implement for anyone with a fundamental knowledge of electronics," and even a near-novice can assemble a starter system with the help of the sophisticated, off-the-shelf devices now available.

But software is all-important for control as well as for other computer applications, and except for a few limited control programs supplied with peripheral boards dedicated to certain hardware systems, the typical home-computer user today would need programming ability commensurate with the complexity, or the

which brings us back to Reuel Launey and his diligent servant, Fred.

Launey was one of the original hobbyists to catch the computer bug, buying a computer in 1976 from the now defunct Digital Group company. That computer was Fred's ancestor; Fred himself is an assembled Heath H-89, which is the clone of the ready-to-work Zenith Z-89.

"I was interested in putting a computer in complete control of my home, as much as possible by voice control," says Launey. "Why should I get out of my easy chair to get to the keyboard, when I only have to say, 'Fred, turn on the light'? There's no need to be so darn serious about it, either. Once in a while, after I've been reading the front page of the newspaper, I say, 'Fred, what do you think about Haig's foreign policy?' Fred's reply is a long whistle and then a boom, when the bomb hits the ground."

Head of the house

Launey says he is about half way to his goal of putting Fred in charge of the house. Fred's tools include the BSR X-10 Controller, a real-time clock, stereo sound synthesizer, and, for when Launey isn't feeling loquacious, a remote hexadecimal keypad. Keying the numbers from 1 to 16, Launey has a subtle menu of orders

HOME COMPUTING

for Fred; for example, Fred can turn one or more lights on or off at the same time, or make one brighter and another dimmer.

Fred's vocabulary of 24 phrases is programmable, so if Launey ever changes his opinion of Haig's foreign

available set-ups including the needed basic machine, and would permit the handicapped to have almost normal control of doors, appliances, the telephone and so on.

The Artra Housemaster package for Heath/Zenith-89 users, (cost is

and home-control-interface functions of the Housemaster board, to control household devices by voice or keyboard, or automatically by date and time. It also calls up any subroutine in the computer's memory. The user is taught via the diskette how to devise his own programs.

Launey's path from home-control curiosity to personal satisfaction to full-time computer afficianado has been paralleled by Ted Benglen of Fort Collins, Colo. Benglen, coincidentally, has used similar tools: He first assembled the H-8 model from Heath two years ago and has added an H-8 and the H-89 personal computer. He and three employees now produce peripherals, including a BSR X-10 interface, a voice synthesizer with unlimited potential vocabulary, and a limited-vocabulary "digitalker" for other Heath/Zenith users. Benglen is also working toward a control-and-communications system to aid the handicapped—especially the blind.

Benglen, who had no electronics background but taught himself by reading and dropping in (announced and unannounced) on community-college classrooms, settled on home control as the first use for his assembled H-8. By no coincidence he had just moved from a high-crime city to rural Colorado, and the computer served as a double-safety.

After setting up an automatic security system, which he could foil himself if he came home earlier than the timer expected, he installed sensors to control heaters, vents, doors and other elements of the house that are usually mechanically activated, and he put the lights on automatic. He "played at the keyboard" to devise new applications with the X-10, such as opening and closing the drapes and venetian blinds. He began experimenting with voice synthesis after the electronic novelty wore off. He wanted to "humanize" his computers. 

"Our computer has been exceptionally beneficial to my family, and I think it's just a matter of time before almost every home will have computing power of some kind."

policy, Fred won't argue. Launey plans ultimately to refine his programming to multiply Fred's potential vocabulary.

Launey is satisfied enough with his and Fred's experience that he has quit his job with the Department of the Navy and founded a company called Artra Inc. to market a peripheral-plus-software package giving extensive home-control functions to a compatible personal computer. At present, that includes only the Heath/Zenith 89 and extant Digital Group machines, but versions to run with most other models are in the works.

Much of the recent development in control systems has been done with an aim (which Launey says is almost reached) to provide a mature and slightly modified version that would enable quadriplegics to control their environments by voice. Control systems for the severely handicapped have been around for some years now, but are expensive when started from nothing and must be operated awkwardly by blowing into a mouth appliance.

Launey's system, which has attracted much interest from professionals in care of the handicapped, would likely be less than half the cost of

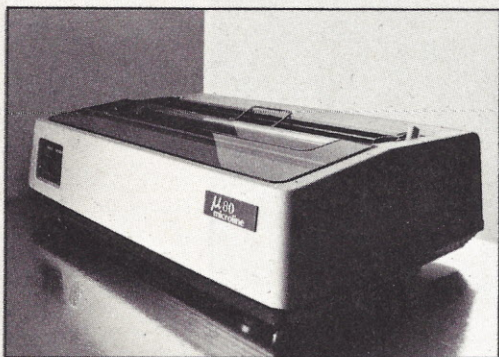
\$299 in kit form, \$399 assembled) includes a real-time 24-hour clock and calendar, voice-recognition firmware, two sound synthesizers, and an H/Z-89 interface for the BSR X-10, which is not included. Options are battery backup for the clock/calendar, dual RS-232 communications ports, and voice synthesis modules based either on phonemes (basic utterances) or on linear-predictive coding, by which the user, in effect, programs the computer to remember and recognize his own speech habits and inflections.

The voice-synthesis option is necessary to make the system respond with spoken phrases as well as to control the environment and to sound gongs and chimes; the user-spoken question, "What time is it?" elicits the appropriate spoken report: "It is now seven minutes after three o'clock." Without voice synthesis, the computer can still answer the spoken question, "What time is it?" by chiming out the hours and minutes.

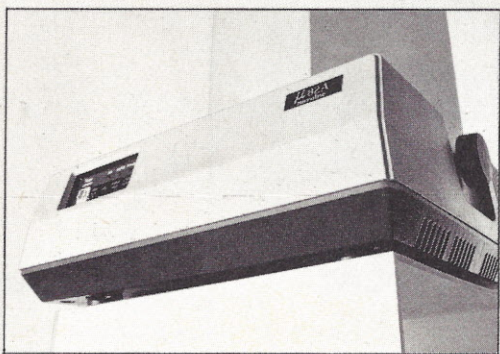
What distinguishes Housemaster, other than conveniently combining several parts of the needed control apparatus, is the included diskette with 18 home-control programs. The master Voice/Time Control Program combines the voice recognition, clock,

OKIDATA

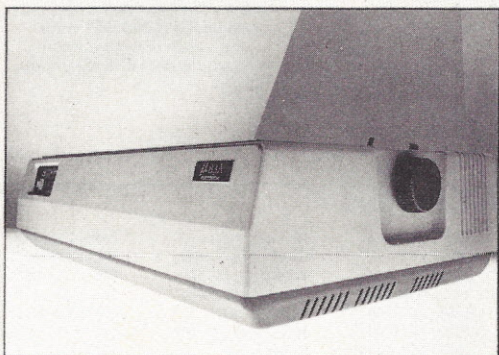
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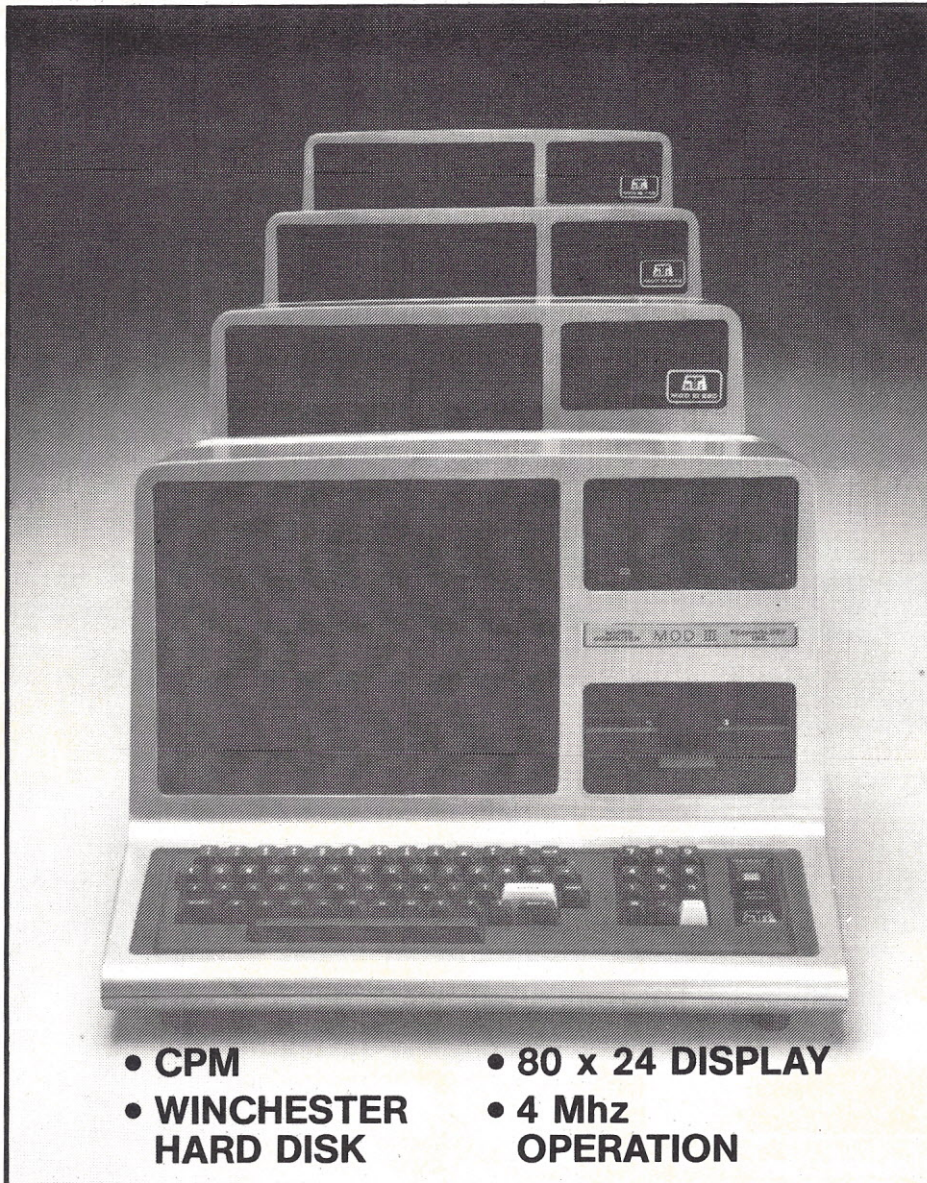


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SPECIAL REPORT

Understanding mass storage: what's in it for you?

Mass storage is more than memory. It's the way in which a computer transfers data from one source to another



Apple Computer recently told the world that it has a hard-disk unit. The 5 $\frac{1}{4}$ Profile is used with the Apple III.



Radio Shack's Winchester disk (an 8-inch unit) attached to the Model II.

Ever had that sinking feeling when you're writing your own program—and the video display flashes “disk full”? Ever spent valuable time swapping disks in trying to update a large mailing list, because you can't get all the names on one diskette? Or have you ever found you can't use certain games because you're short on RAM?

These predicaments illustrate one of the most frustrating—yet subtle—pitfalls of buying and using a personal computer: memory.

“Mass storage” is actually the appropriate term here, because we're really talking about the capacity of a computer to transfer data from one source to another. These sources can be in the computer's main memory, or they can be peripheral storage devices such as cassettes, floppy disks (or diskettes) or hard disks. To confuse matters even more, the term “Winchester drive” keeps cropping up in relation to memory capacity and storage technology. How can sense be made of all these competing media? And what criteria should be used to determine what's right for you?

There are essentially three “tiers” of memory storage, classified in terms of both the physical medium used and the storage capacity (the number of characters each medium can store). Logically, price is an indi-

cation of muscle. Cassettes, which are the first rung of the ladder, are lowest in price; floppies occupy the middle range, in terms of storage and price; and hard disks, including Winchester, found in the penthouse of mass storage, are expensive, but sometimes absolutely essential for the health and well-being of your computer (and for your sanity).

Each of these three major groups involves trade-offs in terms of both price and performance; in every case, you give up something to get something. It becomes a matter of care-



Cassette recorders, while low in cost, offer small-storage capacity and low speed.

fully deciding just what you want to do with your system and translating those general wishes into relatively finite numbers of characters and storage capacity needed. Then you are prepared to look for the medium that matches your applications context.

But you should take more than your current needs into consideration. If you anticipate an expanded series of functions in the near future, then it may be wise to upgrade now. You may have to bite the bullet financially, but the grief you save could be well worth the trouble.

A bit of history

There is one other external mass-storage medium—reel-to-reel tape. The computer industry got its start in mass storage with tape reels and, just like the stereo industry, supplanted reel-to-reel recording techniques with

less efficient, but far cheaper, cassette systems. Given the comparative inefficiency of punch cards, and the problems involved in storing all that paper, tape seemed like a logical alternative. A tremendous amount of information—millions of characters—could be put on a reel of tape. And, given optimum storage considerations, tape could last for a satisfactory period. Eventually tape loses its integrity, so backup copies were required every few years; but all in all, it was a workable system.

For the personal computer the cost of purchasing such tapes, let alone the cost of a tape-drive mechanism sophisticated enough to perform the searching tasks required by a computer (Ever try to find the beginning of a single song on a reel of audio tape?) made that system unwieldy. However, cassette technology—a low-cost and relatively reliable method of recording and reading stored data—was available, and quickly took the place of tape.

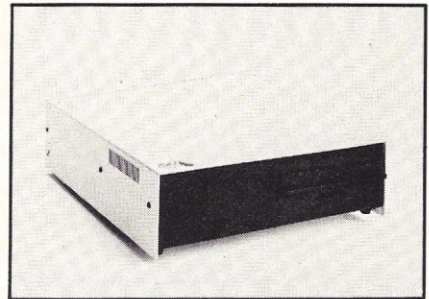
A cassette recorder to go with the built-in interface provided with the CPU was offered by systems manufacturers for around \$30. Cassettes themselves, for both recording and playback of canned programs, were also made available at affordable prices.

But while the cassette was functioning as the medium of choice for the low end of the market, the floppy disk, or diskette, was making headway, primarily at the business end of the market. Given their relatively low cost, floppy disks represented an ideal alternative to reel tape for the business user. They were about as easy to use as a 45 rpm record. They didn't store as much as reel tape, but they were sufficient in most instances.

Starting out with an 8-inch format, diskettes, like everything else in computer technology, became better and smaller. A 5¼-inch version became the new standard and diskettes soon appeared that permitted reading and

writing on both sides of the disk. This effectively doubled the capacity of the floppies, and made them even more desirable as a storage medium.

In the last year or so, hard-disk technology has entered not only the



A fixed disk may need some device to copy the data for backup. It can be packaged with a floppy disk.

business sphere, but that of the personal computer as well. As software programming has become more complex, and the desire for multifunction computers has grown, computers with cassette- or diskette-storage systems have sometimes literally run out of headroom—they need more memory-storage capacity. Hard-disk systems can give them that capacity.

Hard disks, which are metal disks coated with the same kind of magnetic material found on tapes and diskettes, allow for a greater density in the storage of data—a kind of “crowding” together. Thus, for many business-computer users, and for personal and home use requiring a lot of storage capacity, the hard disk has become the medium of choice.

As a subset of the hard-disk universe, the Winchester drive mechanism is gaining favor. Originally developed by IBM for its business computers, the Winchester concept has also been scaled down. A Winchester drive can now provide significant memory for the personal-computer buyer—all he'll conceivably need—and without great expense. Remember, however, that you could easily spend more for a large-memory storage system than for the initial system.

DISK DRIVE BUYERS' GUIDE

Manufacturer

Product

	1	2	3	4	5
Apple Computer 10260 Bandley Drive Cupertino, CA 95014 (408) 996-1010		●		●	
Commodore Business Machines 681 Moore Road King of Prussia, PA 19406 (215) 337-7100				●	
Corvus Systems 2029 O'Toole Ave. San Jose, CA 95131 (408) 946-7700,		● ⁶			
Lobo Drives 935 Camino Del Sur Goleta, CA 93017 (805) 683-1576	●	●	●	●	
Micro Sci 17742 Irvine Blvd., Suite 205 Tustin, CA 92680 (714) 731-9461				● ⁷	
Nestar Systems 430 Sherman Ave. Palo Alto, CA 94306 (415) 327-0125					●
Percom Data Company 211 N. Kirby Garland, TX 75042 (214) 272-3421				●	
Tandy Corporation 1300 One Tandy Center Fort Worth, TX 76102 (817) 390-3011	●		●	●	
Zenith Data Sustems 1000 Milwaukee Ave. Glenview, IL 60025 (312) 391-8192	●		●	●	

- Notes:**
1. Eight-inch Winchester disk drives.
 2. Five-inch Winchester drives.
 3. Eight-inch floppy-disk drives.
 4. Five-inch floppy-disk drives.
 5. Fourteen-inch Winchester drives and networking products for Apple.
 6. Also networking software for various computers.
 7. Double-density drives for Apple II.

While each succeeding storage medium has caught on as commercially viable, all three are still thriving today. Diskettes have not eliminated cassettes, nor does it appear that hard disks and Winchester drives will supplant floppies. Each storage medium has its own benefits—and drawbacks. Only by carefully fitting storage format and need can you make a wise decision.

Cassettes

Cassette tape operates in the low end of the price spectrum; it's not very likely you'll find a cassette recorder used with a business system.

But that doesn't mean that cassette isn't right for you. Cassettes function perfectly well for a wide range of applications—and at a far lower cost than other technologies. For example, if you're intending to use your personal computer primarily for games and home education, cassettes are a very good choice.

A wide variety of recreational software is available for the most popular systems, at prices ranging from \$19.95 to \$29.95 in most cases. Most systems offer an optional cassette recorder and built-in interface for around \$30—so you can be in business for under \$100 to start, and then add programs incrementally without stretching your budget.

It's even possible to perform some programming on cassette, although you can very quickly run out of headroom if your program becomes too extensive. In general, cassettes are not intended for use as a recording medium; they perform best in playback. The reason? The data on a cassette tape must be addressed serially, just like on an audio cassette tape. You can jump back and forth, seeking differing points on the tape, but to do so continually is time-consuming and inefficient.

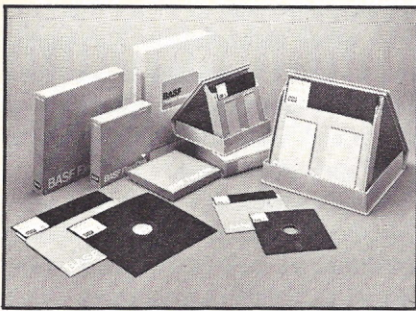
While it is possible to use the cassette as a recording medium for program generation or transfer of data,

SPECIAL REPORT

it's really not practical if you're intending to use your system to generate data. If any single addressing operation involves 2000 or more bytes, you're probably better off with diskettes.

Diskettes

The floppy disk was also an outgrowth of the anti-punch-card movement generated by IBM. Unlike tape solutions (low-cost cassette or high-cost reel), the floppy disk has the benefit of random access at reasonably high speeds. Instead of searching back and forth to find desired information on tape, the digital controller, which addresses the floppy disk, "scans" the entire disk until the appropriate section is located.

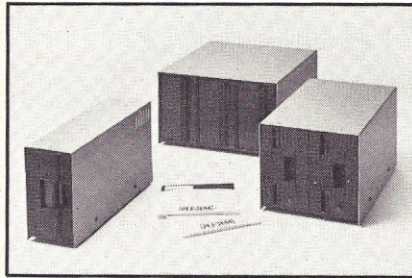


Floppy disks, in both 5 1/4-inch and 8-inch sizes, offer random access to the data, which means high speed.

All floppy disks consist of the same magnetic recording material found in the other media. They are enclosed in a plastic jacket to protect the disk; only a small read/write access notch is cut into the cover. Once inserted into the disk drive, the center of the floppy is gripped by the drive mechanism to permit the disk to spin.

The actual operation of the disk drive is fairly simple. The CPU issues specific instructions for locating data; the drive controller brings the read/write head into contact with the disk; and when the sought-after sector passes under the head, the controller picks up the data pulses and converts them into a format the computer (and you) can understand.

The data on any diskette are organized in concentric rings (like the individual songs on a record). Each ring or track is further broken down



Users with dual disk drive can load their program disk in one, and use the other drive for recording data.

into sectors. When you address the disk, you're telling the read/write head to seek a particular track and sector—and you'll find your data there.

As is typical with growing industries, there are some basic incompatibilities—or at least differing opinions—in the specific formats and recording techniques. Therefore, you have to pay close attention to what these differences mean, because they affect the total quantity of data available for storage.

The first difference is that of size. The first IBM floppies were 8 inches in diameter. This was the de facto standard for floppy disks until five years ago when Shugart Associates introduced the first 4 1/4-inch floppy. The reasons? Lower cost and greater compactness for personal-computer systems.

Smaller can also be perfect for mass storage. With the move toward 5 1/4-inch floppies came the terms "density" and "double-sided." Density refers to the recording of more data around each "track" on the diskette—literally twice as many bits. Hence, the buzzword "double density." Double-sided refers to the ability to record and read data on both sides of the disk, simply by adding a second read/write head to the disk drive (and adding to the cost).

Therefore, the ultimate in disk capacity can be found in double-density, double-sided diskettes. Sound simple? Not quite so. Most disk drives cannot read both single-density and dual-density disks. If your disk drive is a single-density read-only mechanism, you'll have to buy the compatible disks. The same holds true for double-sided recording: The type of disk drive and controller mechanism selected will dictate the choice of media. You can't have it both ways.

What does it mean?

What does all this mean for you in terms of storage? A typical single-sided floppy will have about 80,000 bytes of storage capacity, or about 40 typewritten pages, for example. Adding double-sided disks and a dual disk drive will bring it into the range of 512,000 bytes, which is a lot of information-storage capacity.

You can look to even larger memory-storage systems—up to three million bytes of storage—if you opt for the 8-inch format. This kind of capacity is equal to that of a small-business computer, and is only needed if you plan to use your system in much the same manner.

The need for memory should be balanced against your budget. For example, a 5 1/4-inch disk-drive mechanism with a controller from Apple Computer will cost about \$645. Using your Apple II, you can also go to an 8-inch disk drive from Lobo International, with 3.2 million bytes, for \$1795—more than the cost of the CPU. It's just a matter of what you intend to do with the system. If you're running your own business functions on a personal computer, three megabytes or more of memory can easily be cost-justified. Entire files, such as mailing lists, can be easily maintained on the 8-inch diskette; there's far less chance of swapping the wrong disk or having to change disks in the

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CIRCLE 22

middle of a program with the larger diskettes.

If your mailing list consists of Christmas-card reminders, and you don't intend to write the great American novel on your system, the 5¼-inch format is certainly more cost-effective. For no more than \$700, you can have at least 140,000 bytes of memory with a single-drive, dual-sided system, which will do quite nicely for a broad range of text and data-processing applications.

Clearing confusion

The terms "hard" and "soft" sector disks are also a source of confusion. Hard sectors are actually holes punched around the hub of the disk; inside the disk drive, a light beam shines on the disk, and when it passes through each hole, the sector is noted and marked.

The soft-sectored disks, currently becoming more widely used, involve a formatting process in which the computer writes a "header," basically a

A typical search on a diskette may take one or two seconds; it may take 20 seconds or so to offload an entire diskette. That isn't a long time to most computer users, but if you really live with your system, and it performs vital functions for business or personal management, then waiting that long for data can be frustrating, especially if your files are long and complicated. Floppies can also become scrambled electronically, and you can lose your data through no fault of your own. Hard disk is thus the medium of choice for those who just can't get enough memory.

There are essentially three "tiers" of memory storage, classified in terms of both the physical medium used and the storage capacity.

Hard disk

The "hard-disk" has the same recording substrate as floppies and tape, but it's contained on a metal disk. Initially, the hard disks measured 14 inches in diameter. This later shrank to 8 inches, and with the advent of Winchester technology, it soon dropped to 5¼ inches. The hard disk, as a generic mass-storage technique, offers users significant benefits in terms of storage capacity and access—but the bill is also higher.

For the typical personal-computer user, the hard disk is simply too expensive—anywhere from \$5000 on up for the non-Winchester variety. Thus, the hard disk has primarily been the province of the large business-computer user—a company with multiple terminals and huge data files to be maintained. Imagine the chaos that would result if an employee in a firm of that size had to sort through hundreds of floppies to find a particular file; while possible, it's certainly not practical.

The hard disk offers users storage in massive quantities—5, 10, or 20 million bytes or more of information. It also provides faster access times—ranging from around 70 milliseconds to up to 800 milliseconds—than diskettes. Hard disks operate this quickly even in an environment in which

However, the trend toward a dual-disk-drive format continues. The reason is flexibility. The dual drive permits one disk to be used as the operating disk, while the second drive can become a recording disk. Entire files can be saved from the operating disk, or from the CPU's own RAM.

This offloading of information can save you a lot of grief down the line. Power surges, power failures and other unexpected events can purge files and cause loss of data. It's just as traumatic for an individual computer user to lose data as it is for a large corporation. The dual-disk drive provides a flexible means of protecting yourself. You can record from your machine's RAM into a single disk drive, but the dual drive seems to be the standard for flexibility.

Again, there's a price to be paid. Commodore, for example, offers a dual-sided, dual-disk drive for \$1795. Both manufacturers and peripheral vendors also offer a wide range of single- and dual-disk drives, but your ballpark price range should be \$500 to \$2000.

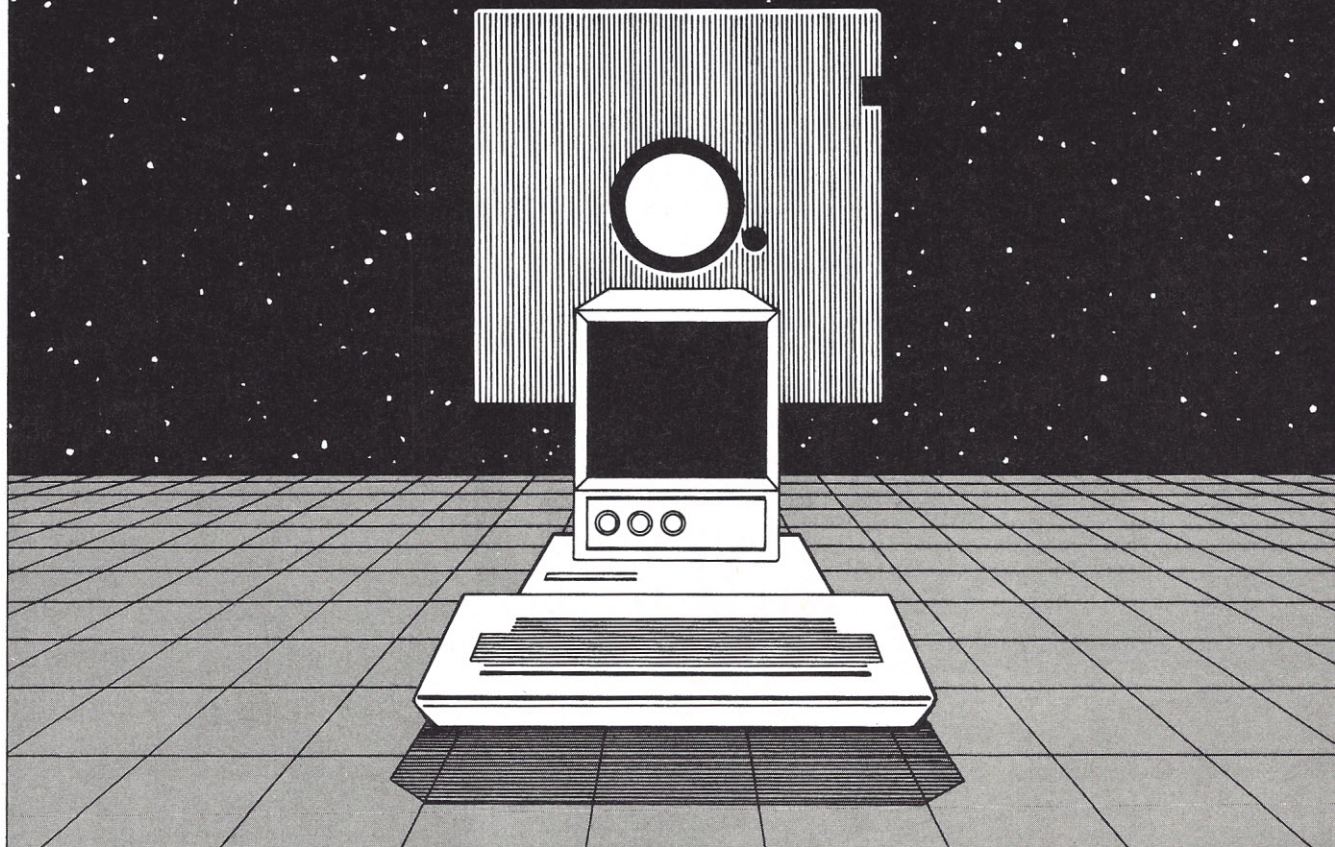
sector number, as well as the signals required for recognition when the read/write head is seeking specific data. Compatibility is the key; make sure the system can accept soft-sectored disks if you're planning to use them.

For the broad range of consumer computer use, diskettes have proven to be a reasonable compromise on cost and capacity. For less than \$1000, the user can double or triple the on-board RAM of the system (the latter, while primarily serving as the operating memory for real-time use, can also serve as a temporary memory), and provide a means of external memory storage that saves vital information. If you've ever lost an important document, you know that the price can be well worth the peace of mind it buys.

But what about those of us who hunger for even more memory—those who need more storage for large files, or who need to access large amounts of previously stored information on a consistent, but random, basis?

continued on page 74

Professional proofreading on the APPLE II Computer is now a reality



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Numerous options are provided throughout the program to enable you to completely control all activities of the Apple Speller. These include the ability to ignore both

control codes and formatting commands, an alphabetical listing of either misspelled words or all the words in your document along with usage frequencies, multiple options for the action taken with each misspelled word, and much, much more! A verification mode is provided to allow you to examine and dispense with misspelled words while viewing them in the actual context in which they appeared in your file.

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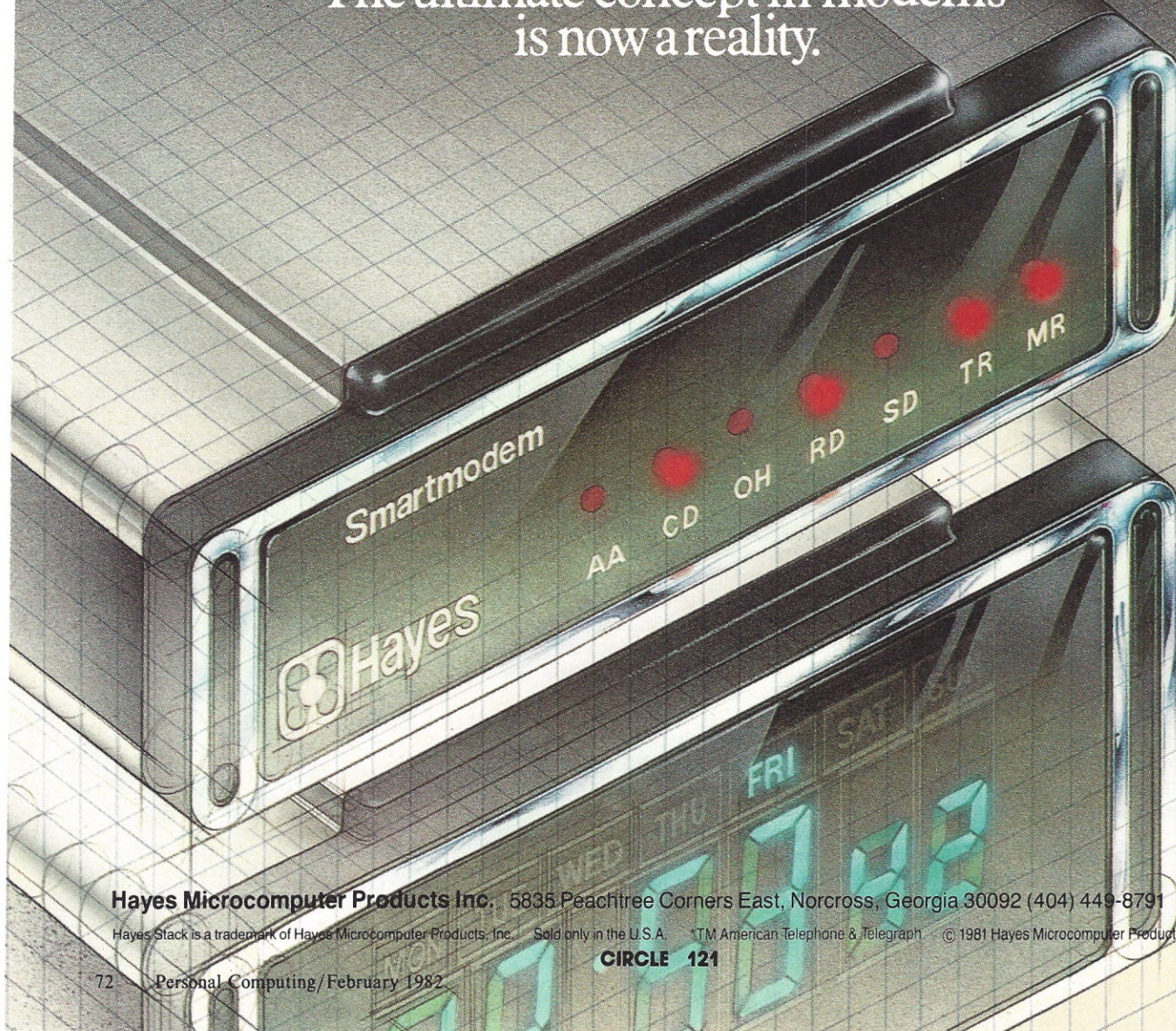
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CIRCLE 121

KNOWLEDGE IS POWER

True when Sir Francis Bacon said it in 1597 at the dawn of the scientific age. And true a thousand times over in 1946, when the brilliant mathematician John Von Neumann supplied the key idea—the stored program—that made possible the modern computer.

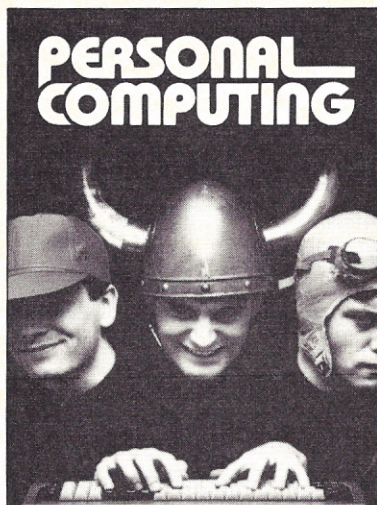
Today the age of the micro-computer is upon us and individuals *personally* own machines vastly more powerful than Von Neumann's. Personal Computing, the hallmark of the 21st century. And for the readers of PERSONAL COMPUTING magazine, the 21st century has already begun.

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Mass storage

continued from page 70

several users are accessing data on the same disk. But why all the interest in the hard disk if it costs so much?

Enter IBM, as it so often does in the computer industry. For all the speed and flash of the hard-disk concept, there are drawbacks. The read/write heads of the hard-disk mechanism fly over the disk material much more closely than they do in the case of floppy disks—and at higher speeds. The minimal clearances involved can mean that even

the Winchester also started in the 14-inch format, it quickly migrated to 8 inches, where it became very cost-effective for the serious business user.

The Winchesters have been further downgraded into the 5¼-inch format, compatible with their floppy drive counterparts, but adding anywhere from five to 10 million bytes of memory capacity. While prices are still a little steep (about \$3500 or so for five million bytes of memory), the Winchester is still lower-priced than

in three memory capacities—5 megabyte (\$3750), 10 megabyte (\$5350), and 20 megabyte (\$6450). Lobo International offers a combination Winchester and floppy unit for the Apple, with 6.4 megabytes for \$3500.

At the same time, both Radio Shack and Apple have announced hard disks for their computers. The Apple Profile is a 5-megabyte, 5¼-inch Winchester, and is currently offered with the Apple III. It will be offered in conjunction with the Apple II in 1982. It costs \$3499.

Radio Shack offers an 8-inch Winchester with 8.4 megabytes of storage capacity for \$4495. The drive works with the TRS-80 Model II.

On the surface the concept of a Winchester—or any hard disk, for that matter—seems relatively clear. For a higher price, you get a significant increase in memory capacity, which is vital for complex transactions.

There is also the question of backup memory. While the Winchester concept largely eliminates the potential for disaster with hard-disk systems, the possibility exists that something will go wrong with the disk, and you'll lose your data. More commonly, even with five or 10 million bytes of information, you'll eventually run out of space if you record every piece of data you generate.

The Winchester is a sealed enclosure, so you can't swap a disk to gain more memory. You either buy a new Winchester, which is hardly practical, or you look for a backup mechanism by which you can offload files for storage, and keep the Winchester up and running for operating memory.

Recording tape

For larger computer systems, tape recording systems have proven to be very cost-effective, because the data

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Once you've waded through the mire of technical details and have found what you really need, you can then begin to make an intelligent assessment for a mass-storage-device purchase.

the slightest particle of dust in the drive mechanism may one day find its way between the head and disk surface, causing the head to scratch the disk. This phenomenon, in the parlance of the larger systems world, is called "crashing a disk," and occasionally the disk does indeed break. In the process you'll lose all your data.

That's why IBM went back to the drawing board to develop a hermetically sealed enclosure that contained all the necessary ingredients for hard-disk storage. The result was a two-drive unit with 30 megabytes of memory on each drive. Winchester was the code name given the device by IBM.

Cost effectiveness

For reasons of design and production, the cost of Winchester drives, compared to standard hard disks, is substantially lower. While

other hard disks.

The operating advantages of a hard-disk system are obvious: Transactions such as merging or updating lists can be very quickly accomplished, and a raft of documents or data can be stored on the Winchester, with virtually no chance of failure or loss of memory.

The rush toward the hard-disk—specifically the Winchester—concept has involved both manufacturers and peripherals vendors. Firms such as Apple and Zenith offer Winchester hard disks as upgrade options; firms such as Lobo, Corvus and Percom offer after-market hard disks for Apple and Radio Shack systems, as well as many S-100 computers. The fact that the majority of these products have been announced in the last few months indicates how quickly the hard-disk concept has caught on.

Corvus, for example, offers a 5¼-inch Winchester for the Apple III

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So says Gloria Stein, a fifth-grade teacher at Lawton Elementary School in Ann Arbor, Mich., who has just completed a two-year pilot program involving personal computers.

Stein's school was one of two elementary schools in Ann Arbor that tested PET personal computers in all disciplines and at all grade levels.

"It really has been an incredible experience for me to watch because my whole thrust was to try to find a place where the computer doesn't work," Stein says. "I'd think it wouldn't work with the kindergarten students, and then I'd go in with them and hook the computer up to a big monitor so I could deal with the whole class at the same time. Those youngsters were amazing. They ex-

perienced no trouble, no hesitation and no fear. They were groping around, finding their own keys on the keyboard and remembering to return.

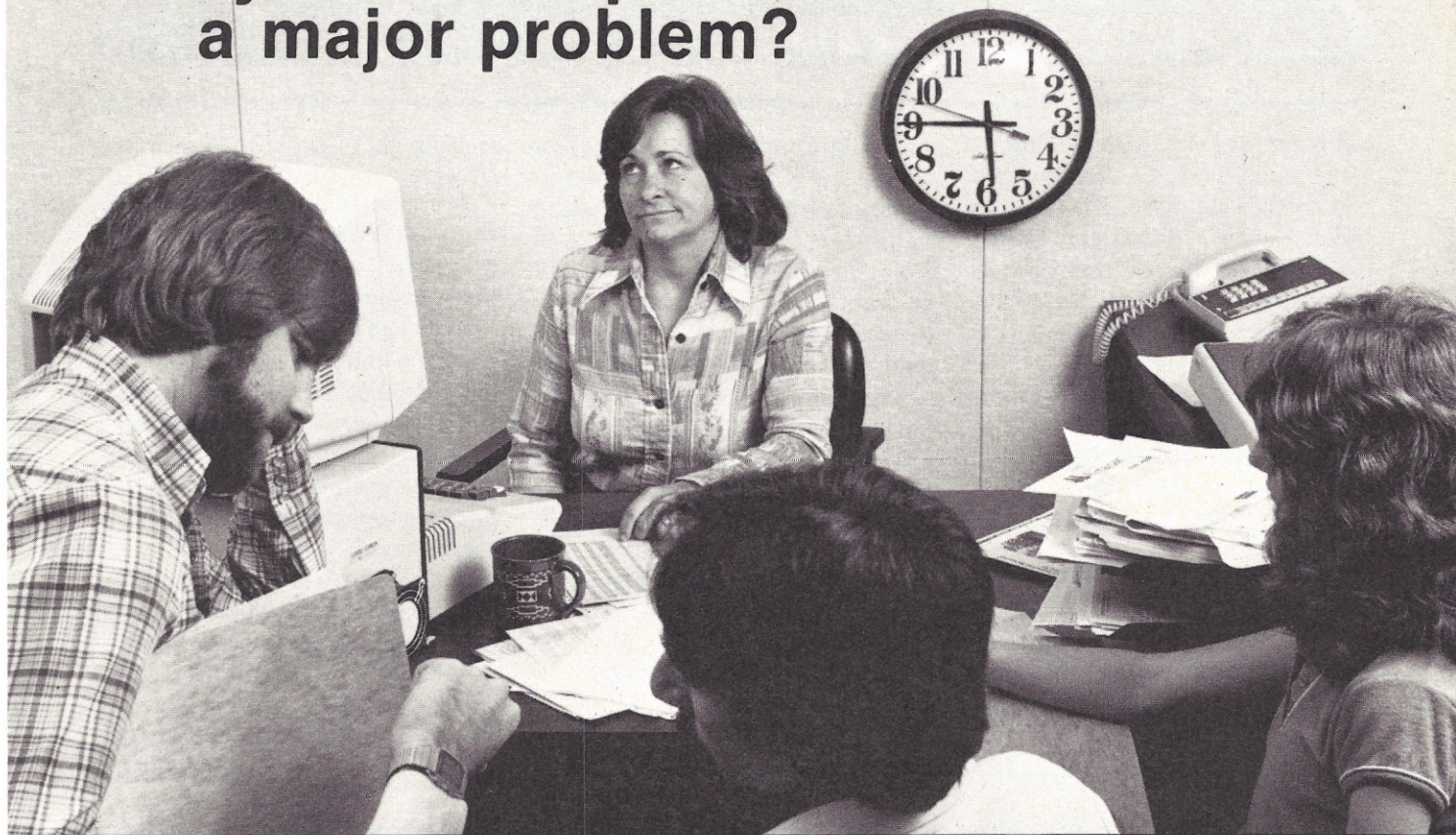
"You literally have to peel the kids away from the computer," Stein says. "They take to it like ducks to water."

Three PET personal computers were purchased from Commodore for the pilot program at Lawton. Each computer was scheduled for one or two sessions per week.

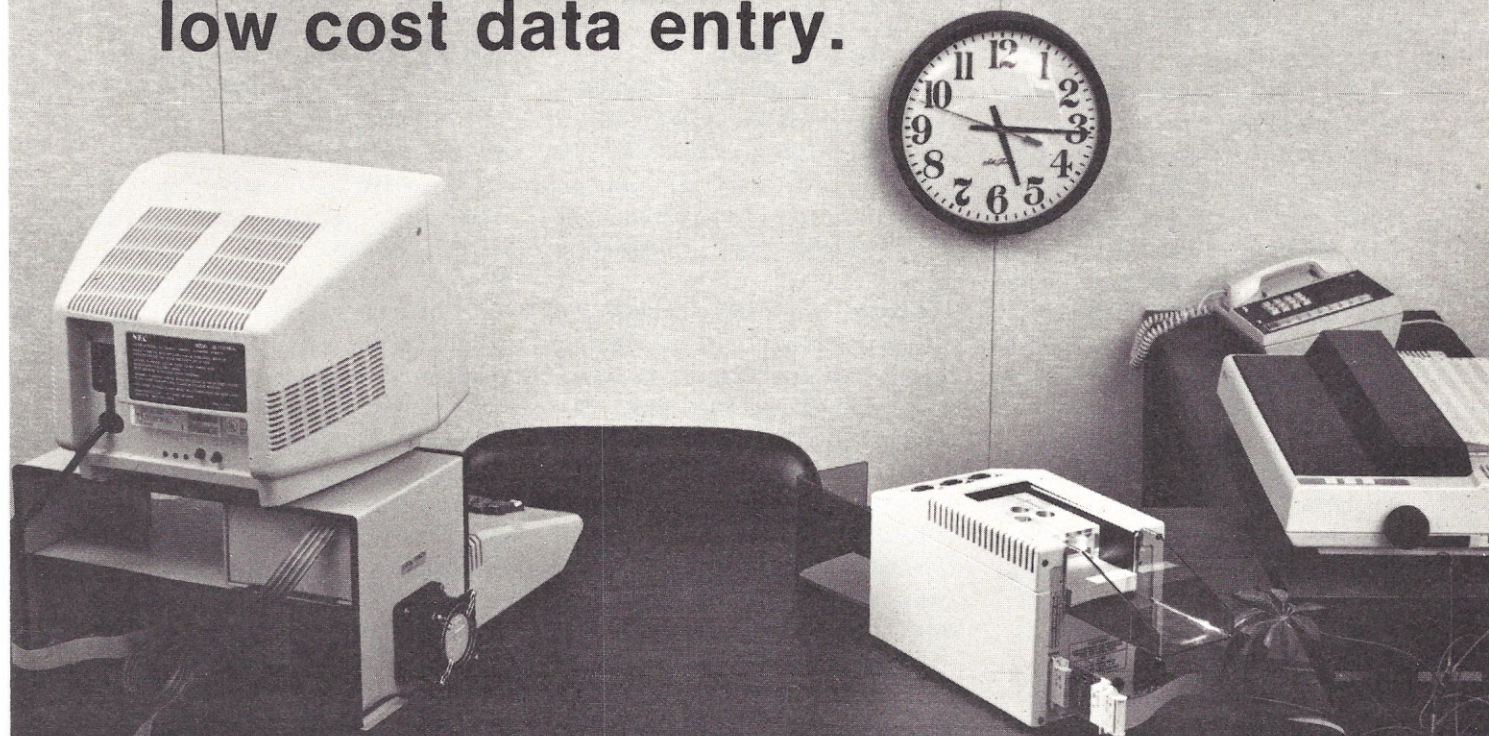
"The teachers felt that they were almost obliged to see that when the



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CIRCLE 2

computer was in their classroom, every youngster had a turn to use it that day," Stein says. "For 25 or 30 children to have an adequate turn at the computer in one afternoon is pretty impossible. So all these frustrations came up for both the teachers and the children.

"There's just no question that if the computers are to be used as learning tools, you have to have them when you need them," Stein says.

She illustrates her point by com-

One interesting test application came out of one of the school's programs, called English as a Second Language (ESL). According to Stein, Lawton is "a small version of the United Nations." Some of the students who attend the school are children of students at the University of Michigan in Ann Arbor. Consequently, some youngsters arrive each year not speaking any English—not even knowing a common alphabet.

The ESL teacher at Lawton want-

grading the data. The key is the software."

The natural curiosity of the children makes it imperative for Stein to be prepared at any time for that nagging question, "How does it work?"

"You can't get out of it," she says. "About a third of the class will use the computer for about two weeks and then start asking, 'What do I have to do to get it to do this?' Whether you plan on it or not, you end up teaching them basic programming."

Stein says her approach to teaching with computers involves a concept called "coming in the back door."

"Instead of saying, 'I'm going to teach you something that I want you to know,' I wait for the student to say, 'I need this information,'" says Stein.

"There's a tremendous amount of parental pressure aimed at getting these computers into the schools."

paring the computer to an encyclopedia. "If you have just one little time slot its almost like saying, 'Today each student must spend 10 minutes with the B book of the encyclopedia.' No teacher would ever do that."

Over a period of two years, the pilot program had changed the school administration's feelings. The computers are now concentrated at the fourth- and fifth-grade levels where teachers have at least one PET at their disposal at all times. There are also three computers in the school's library that can be loaned to teachers for classroom use, or can be used by students for independent work.

The PET serves the purposes of Stein's school. "I like the fact that it is all one unit and that it is easy to transport," she says. "I also like its cosmetic look. It's a neat looking unit and it does the job."

Making it work

The motivation the computer inspires in the children makes it a natural tool for remedial work. The teachers at Lawton Elementary have witnessed increasing success in helping children overcome difficulty with certain concepts.

ed to use the computer with her students. Simple drill-and-practice programs containing graphics were developed by Stein with specific tasks for each child, and have achieved very successful results.

Children in the ESL program use the computer in the school's library after their English lessons. This does not take away from the time the teacher spends with the children, but reinforces what they learn during the lessons.

Another successful application of the computer has been introduced to Lawton's music department, using a program that has no sound. The teacher connects the computer to the large monitor and teaches her students to read notes, signatures and intervals between notes.

Stein has also written programs on electricity and magnetism for science units. She is currently using them with her fifth-grade class.

"The trick is to give the children the material they need," Stein says. "It's very helpful if the teacher knows enough about programming to create a program for the specific needs of a child. Once you have the program you can get in there and keep up-

Parental pressure

Where did the idea of putting computers in the schools come from? "There's a tremendous amount of parental pressure aimed at getting these computers into the schools. Administrators and school boards everywhere pay attention to the parents," Stein says.

During the pilot program in Ann Arbor, only two elementary schools were scheduled to have computers. However, parent-teacher organizations in some other schools wanted computers for use in their schools. Therefore, many schools in the system received computers because the parents went out and bought them.

"It's a groundswell that I don't think anybody is going to stop," Stein says. The future of the computer in the classroom is just beginning.

"I was asked when the secondary schools could be prepared for computer-literate children," she says. "My response was, 'You had better be prepared next September. Computer-literate youngsters are out there now and if they are not getting computer knowledge in the school, they are getting it in some other place.'" 

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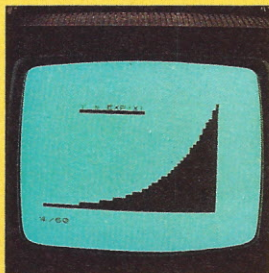
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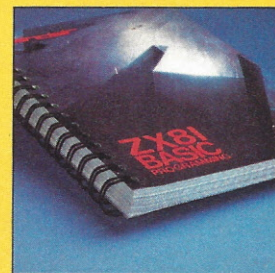
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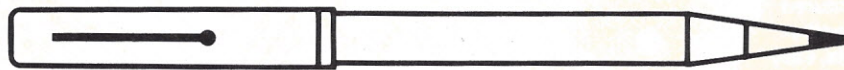
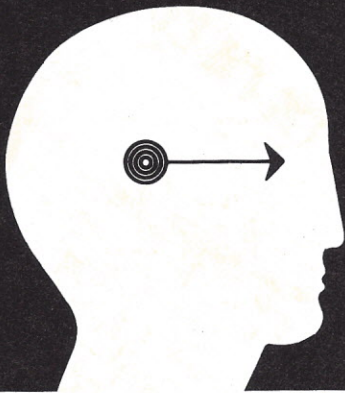
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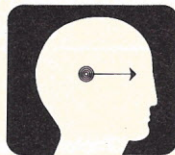


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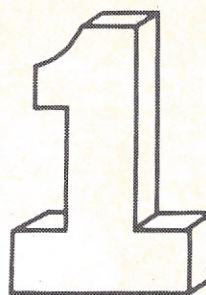
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CIRCLE 28

Presentations

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either from its manufacturer or from the user's investigation of the third-party market.

Cost is commensurate with sophistication, and except for a few elite applications, such as equipping the computer to generate color microfilm, would be considered fair value by anyone who could use the benefit and was able to install a personal-computer system in the first place.

As if to prove that the future of business graphics belongs to all companies and not just the big ones, several personal-computer producers have recently introduced models for small-business use with graphics functions either integrated or easily included as options at the time of purchase.

Hewlett-Packard, long famous for

the graphical aptitude of its mini-computers, and already having a personal computer (HP-80 series) in use for scientific applications, has incorporated this experience into the new HP 125 personal computer for general-business applications.

The 125, also usable as an intelligent terminal in a network, has dedicated printers and graphics plotters to get the most from the Graphics/125 software package. A user without programming knowledge can convert tabular data to bar, pie and line charts and prepare text slides. Multicolor plotting for paper or overhead transparencies can originate with keyboard entries or the retrieval of predefined charts and slides.

NEC's Pertec PC-8000 Series offers a color monitor for creating

graphic images in as many as eight colors. Even the black-and-white version permits three brightness levels, allowing emphasis within the same display. The printer that NEC developed for the 8000-series hard copies can also be interfaced to many other personal-computer models.

Others available

The name of NorthStar's recently introduced Advantage model was carefully chosen—the "advantage" is the integrated graphics for business, word or scientific data processing. In addition to high-resolution, black-and-white generation of standard charts, and 3-D versions of those charts plus complex 3-D designs according to the user's imagination, the Advantage can be interfaced to graphics hardware and software established for the NorthStar Horizon models.

The Cromemco Z-2H Graphics System, based on a 64k personal computer with powerful hard- and floppy-disk storage capacity, provides very high-resolution—754 × 482 pixels—and an almost limitless palette of colors. Graphics software comes with the system but Cromemco's 13-inch color monitor is optional.

The versatility of the system is demonstrated by one of the "big eight" accounting firms that offers a rental and leasehold-management service to airports. Everything that a potential lessor might want to know about the configuration and availability dates of commercial space within an airport—shopping and parking concessions, restaurants, car rental and other service booths—can be viewed on videotape anywhere in the world.

As these and other approaches to personal-computer graphics demonstrate their value in the business market, more systems will follow. 

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Investigative research

continued from page 47

Mart, is an information-brokerage service which has been helping people with information needs for nearly 10 years.

"I can locate published data about any subject you can name," Bellomy states. "I'm currently accessing 300 different on-line services, but if a potential client needs information that's not available in one of those 300, I can subscribe to the one that will give me the information for which I'm looking."

Bellomy maintains that his service was one of the first of its kind to open its doors to the public, although there are more than 100 like it in the U.S. today.

"There are hundreds of data bases on the market, but not everyone can justify the access cost," Bellomy says.

"That's where The Info-Mart comes in. A company with information needs that can't quite see investing in a computer and subscribing to an on-line service will call me."

A lot of businesses and individuals seem to fit into that category. Bellomy says he has hundreds of entries on his client roster; some of them are one-time customers and others come back again and again.

"While a medium- to large-size law firm will have its own computer and subscribe to the LEXIS or WESTLAW services, the firm with two or three attorneys will turn to me as a resource," Bellomy says. "I'll charge about \$450, do a thorough search, produce a printed, bound report and take about two weeks to do it."

Bellomy's technique is thorough. Once he's ascertained what it is the client wants to accomplish, he seeks the best data base for the job, goes into it and selects a few pertinent citations to read. He repeats this process two or three times until he's convinced that he has put together the kind of comprehensive information for which his client is looking.

"I had a call from an attorney whose client was filing suit against a pharmaceutical company," Bellomy says. "His client maintained that she had contracted a serious illness from a particular pill the company manufactured. The attorney wanted to establish that warnings had appeared against this pill in prior medical literature, and that the company should have alerted the medical community and the public to this fact.

"I did a search and discovered that there were numerous articles referring to the pill and its effects. The attorney could have spent days in the library poring over medical journals, but I got him the information he needed in a fraction of the time," Bellomy says.

Bellomy thinks it would take the average person about 200 hours of diligent searching to find the same data he can collect in just a few hours with the data bases. Considering that, \$450 seems fairly reasonable.

"The concept of a computerized information library is a modern phenomenon that's going to get bigger and bigger," Bellomy states. "As more businesses invest in personal computers to automate certain basic office functions, more businessmen are going to become aware of the vast resources available to them through those computers."

But won't that have a negative effect on the booming business Bellomy is doing today? "Well," he says, "maybe it'll come slower than I think."

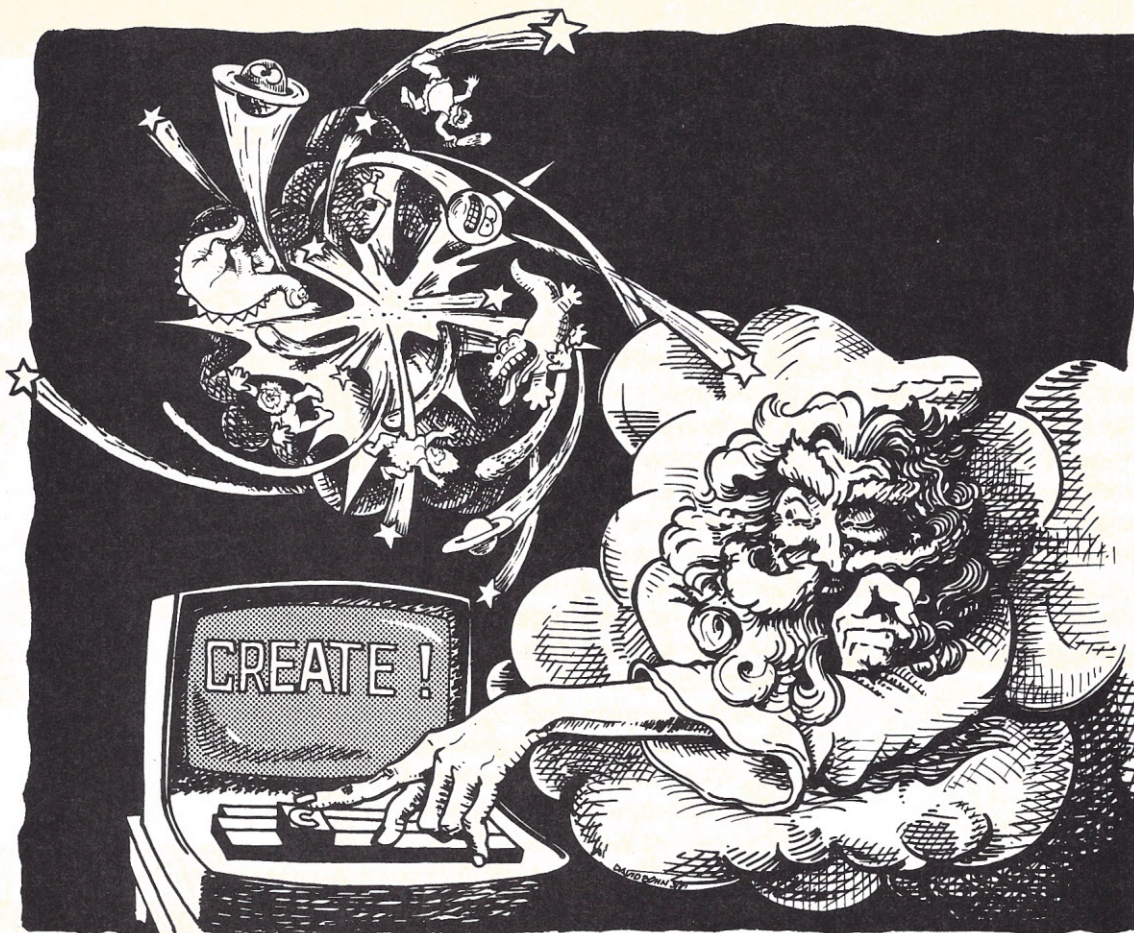
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COMPUTING CONSIDERATIONS

feel that they have some control over the change."

But Dr. Peelle also sees managers having their own problems when initially using computers. "The manager himself may resist the use of personal computer. He may see the use of a computer as not within his role, but rather a secretarial task, a lower-status task."

This view is in agreement with that of Dr. Joyce Brothers, who feels that executives relate to a computer's keyboard as they relate to the key-



Dr. Brothers: "Don't set unnecessary emotional blocks in your way."

board of a typewriter—that this is something a secretary does, not an executive. It is Brother's opinion that executives will fare better with voice-actuated computers.

To avoid this jolt to the ego, Peelle suggests that "managers become the success models for their workers. Once a manager is using a personal computer, he will be able to handle large amounts of information. He'll make higher-quality decisions. He'll be seen as the one who uses advanced technology, the one who is on the leading edge. And that's where status and success are tied in—and where frustration is avoided."

Oh, those kids

People often say that children take to computers like ducks take to

water. Dr. Gordon Berry, UCLA professor and chief educational consultant on the Children's Discovery Learning System by Mattel, says that, "The child's readiness to learn personal computing has to do with his maturity. If the child is ready to use it, and if the learning is a correct process, then the child will not throw a new tool away when he first meets it. So one of the first principles to use to avoid frustrated children is to make sure the children are ready. Learning personal computing is like anything else. It's an active process, not a passive one, building on what the child knows, and making the new knowledge part of a familiar universe."

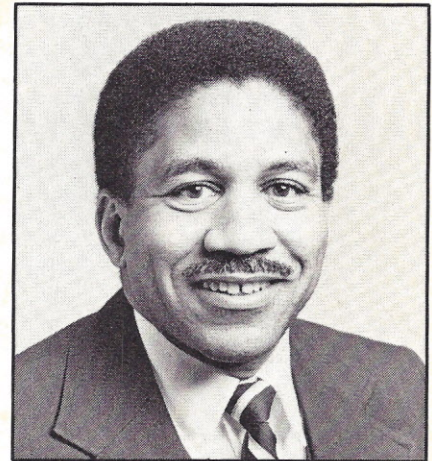
But perhaps most important for adults who want to learn computing is Berry's contention that children, unlike adults, are not intimidated by computers. Maybe adults need to realize they are going to make many mistakes. Jack Nevison, of Nevison and Associates, a Boston firm that teaches executives how to compute, says, "Computing, like no other activity, teaches you humility."

It is Nevison's contention that frustration when computing is just the result of unanswered questions. "You're frustrated if you are puzzled in such a way that you see no solution to the problem—if it's an intractable question. But there are all sorts of tractable questions like 'Why doesn't this program work right now? Why don't you put some more print statements in your program and see what the variables are?' Asking these questions makes computing challenging, not frustrating."

To Nevison, you have to have a very high tolerance for frustration because around computing there are large areas to which logic does not apply, such as the operating system commands. How do you save a program? How do you copy a program? How do you edit a program?

"These are all arbitrary rules. What you should do is devise your

own little manual, develop your own notebook—a personalized user's manual. Or you must learn how to use the manufacturer's manual, which is essentially a thesaurus or a



Dr. Berry: "A child will not throw away a new tool when he meets it."

dictionary. But if you develop your own, you won't have to keep rummaging around in the big book, which is very frustrating—knowing the answer is there but not knowing where," says Nevison.

Learn the language

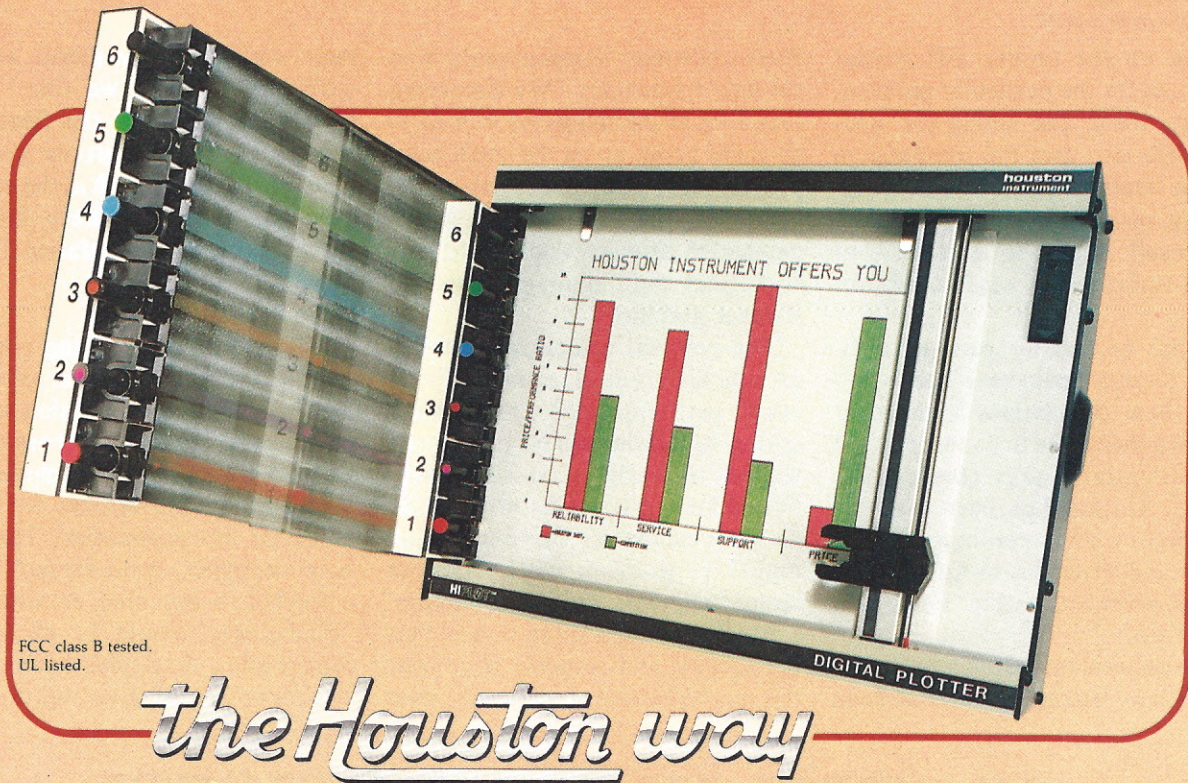
You must be very careful, according to Nevison, to distinguish between two kinds of things: logical problems that are solvable by reasoning and problems whose only solution is knowledge of language. How do you know which is which?

"You need to know the language of the operating system. Most of that is not very logical, like any language. You need to have a book that guides you through it. You also need very elementary illustrations of the logical things you can do within a computing language. The contents of your net set of primary tools depends greatly on what you plan to do first.

"The elements of syntax in a language are arbitrary. Once you've learned the language, you're working in a reasonable universe."

continued on page 140

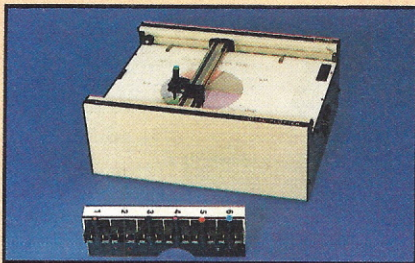
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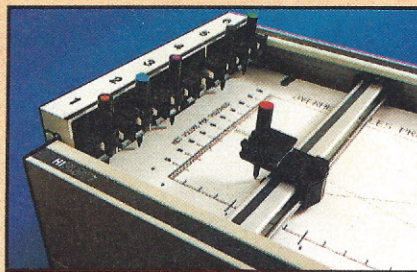
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CIRCLE NUMBER 34 FOR LITERATURE
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Weather

continued from page 52

setting up the proper differential equations for the particular problem, running them, and noting the solutions. He also uses the computer to handle statistical calculations involving many subcalculations. The end result might be a graph that shows variations in wind speed over time.

Before he had his personal computer, Dutton would have had to perform these calculations by hand or "get somebody else to do them on the big computer," says the meteorologist. Dutton has been working with his own computer for a year and a half and writes his own programs, but has never bothered to "fiddle with FORTRAN."

It is no accident that personal computers have become popular at Penn

State while most of meteorology is on the larger machines. "We discovered that a lot of the things we wanted to do could be set up on the small computer," says Dutton. With these machines, they are able to model particular atmospheric conditions, statistical data management and weather graphics.

The personal computers are used to run differential equations and other mathematical calculations critical to weather study. In research weather reporting, speed is not essential, so Dutton is not disturbed if the personal computers "have to run all night" to perform work that the larger computers could do in minutes.

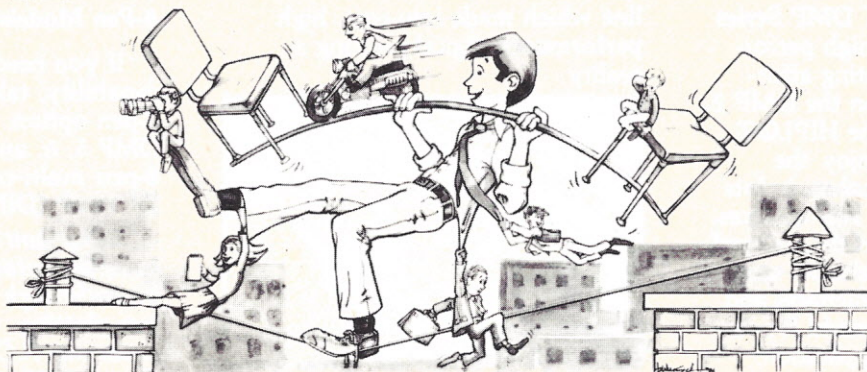
More important is the control that the faculty and students have over the machines and, as a result, over

their work. "We can diddle around with any problem we like," says Dutton, emphasizing the flexibility the personal computers give to meteorological research at the school. And the machines help Dutton "avoid laborious computation."

Even more

Dutton foresees growing application of the personal computers in weather studies. In addition to the work he and his colleagues are doing, he suggests that the machines are useful as control devices for measurement instrumentation. The personal computer, in the form of either a keyboard machine or simply a "black box," could be placed at remote sites. A telephone call to the computer would give weather re-

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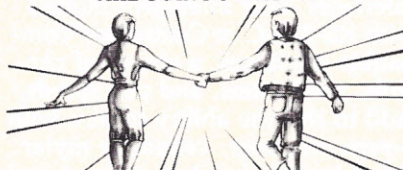
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CIRCLE 37

PROFESSIONAL COMPUTING

searchers access to the data being collected at that site while the machine also controlled the data-collecting instrumentation.

In California, efforts are already well under way to take personal computer developments out of the weather laboratories of large universities and put them to actual use in the field. Roland Hauser of Narrowcasting describes part of his work as "using personal computers as a way to unlock the research lab."

Personal computers being used by Narrowcasting Inc., a not-for-profit weather information center, provide actual weather information to managers, quickly, accurately and geared to their exact location and need. In one test in progress, agriculture and air-pollution control officers from nine countries north of Sacramento, Calif., are using the

Narrowcasting system to lessen the effects of pollution from burning rice straw.

Rice straw is a residue left after a rice harvest, explains Dave McBride, Yuba County agricultural biologist and air-pollution-control specialist. The rice residue doesn't mix with the heavy but shallow clay-based soil of the valley. The buildup of the residue quickly leads to disease in new rice crops, so it is necessary to burn the residue.

The burning residue generates an irritating air pollutant, and a large outcry from nearby cities like Sacramento. The rice farmers, thinking it would help the problem, burned all their fields over a very short period. But they didn't take into consideration an important factor in air pollution—weather conditions.

Guided by personal computers in

each county office, combined with appropriate weather data from Narrowcasting and actual weather reports from instrument stations in the fields, the burn is now being spread over many days. To minimize the effects of pollution, particular fields are selected for burning on a given day based on weather conditions. Of particular concern are conditions that would lead to weather inversions (like those that produce heavy smog in Los Angeles) which trap the smoke from the burn and prevent it from dissipating. "The computer lets us pinpoint the best spots to burn," says McBride.

County computers

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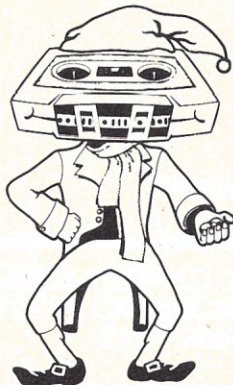
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CIRCLE 97

PROFESSIONAL COMPUTING

fices. Each day the fields ready for burning are entered into memory and daily printouts of "ready acreage" are received for each county.

McBride is very impressed with the Narrowcasting information. "We can get details for areas as small as 40 square miles," he reports. By combining the Narrowcasting data with information from weather stations scattered throughout the nine-county basin, county officials, using personal computers, often have accurate weather information before the local media, says McBride.

The rice burning program began over a year ago when Hauser approached the county officials with Narrowcasting's MCIDAS program as a way to solve the pollution-control problem. Narrowcasting, in conjunction with the University of California, put together a program to de-

velop the crucial ventilation figures for the entire basin, says Glen County Agricultural Commissioner Ed Romano.

The final step was to put a personal computer in each county office, allowing the data to be quickly communicated between offices so field burning could be scheduled. It is a massive job, Romano points out, with approximately 500,000 acres of rice in the nine-county basin.

The system, using telephone lines for communication between computers, was turned on this past September and already is a success, says Romano.

What else?

Now that each county office has its own personal computer, Romano foresees increased use of the machines. "They will serve more than

one purpose," he says. He would like a program using similar weather information to regulate spraying of the fields, and eventually the personal computers may be used for irrigation planning.

In the meantime, Romano hopes to get the county records and books into the personal computers. "This is our first project. We are just learning to use these things," he states. Romano believes that many western cities, especially, would benefit from the combination of weather data and computers, particularly for air-pollution control.

It is in the area of "real-time weather" that Hauser sees the personal computers being particularly effective. What good does it do someone to know what the weather is like at the nearest major airport, he asks, when the real concern is a nearby

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CIRCLE 41

field? Personal computers can be especially powerful handling the actual local weather data.

Narrowcasting doesn't ignore the value of the large computers in weather forecasting. The organization has its own MCIDAS program, which takes in all the available data. To be truly useful, however, those data must be taken down to the local level and, if necessary, corrected to account for what is happening in the particular location. "The farmer can often see that the large computer [prediction] is wrong," says Hauser. This is the kind of weather study that results in local decision making, says Hauser.

As the economy determines the need for accurate, immediate, very local weather information, the personal computer will find broader acceptance in the world of meteorology,

Hauser says. The Narrowcasting system is currently being tested by a variety of people who need Hauser's kind of weather information, the rice growers among them.

From the field

Getting that kind of information will be the job of the personal computer. "You need the smaller machines to get the information out of the big ones," says Hauser. Personal computers will also gather information from the field, controlling measurement instrumentation and tracking local data.

Personal computers are allowing people to take part in a weather-information revolution, bending and shaping the worldwide stream of weather data to their particular needs. These machines are helping people to intelligently address critical

issues such as air pollution, weather resources and energy needs.

For businesses and activities in which weather plays a crucial part, the efforts of the California rice counties and organizations like Narrowcasting offer the promise of better decision-making ability through the integration of personal computers with the giant weather data stream.

For those who study weather, personal computers offer a new tool for manipulating data and ultimately understanding more about how weather works. Weather-program libraries, such as the one at MIT, are only just getting under way.

It is in weather-based management decision making, requiring quick, accurate weather data, that the personal computer is soon most likely to shine. 

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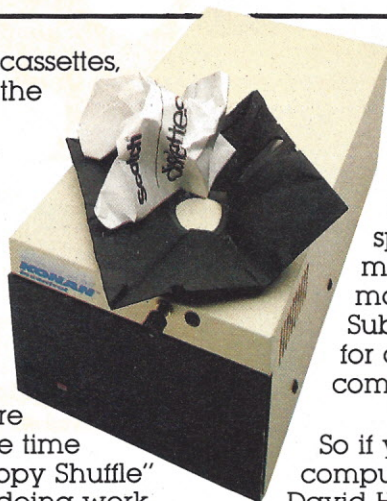
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continued from page 16

tangible medium." However, most copyright speakers advised the audience to register their computer programs with the Copyright Office to obtain *prima facie* evidence of the date the work was created and the contents of the work itself. If you have registered your program with the Copyright Office before someone infringes your copyright, you can request statutory damages and attorney's fees.

Speakers debated the advisability of submitting software in source-object-code form. If only object code is submitted, the Copyright Office delays registration and requests a copy of the source code. If the registrant refuses to submit a copy of the source code, the Copyright Office proceeds with registration of the object code, "under the rule of doubt," if the registrant sends a letter substantiating that the object code represents a work of authorship. Some speakers said registration under the rule of doubt might cast doubt upon the validity of the copyright registration.

Some speakers in private practice said they would not advise their clients to submit programs in source code. Their concern—source code can be copied—was somewhat allayed when a Copyright Office spokesman said programs are stored with other works and are not indexed as programs. So a would-be copier must know the author's name, the title of the work, the name of the copyright claimant or the registration number of a program to request a copy of the work. If the author is a software house, it could be relatively easy to identify computer programs. But Joe Smith is not easy to identify as a computer programmer.

The Patent Office encouraged attorneys to apply for patents if the software transforms or reduces an article to a different state or thing, but the office also reminded attorneys that software must be novel and meet other criteria to be patentable.

Trade-secret law offers the best protection for software, according to Roger Milgrim, author of *Milgrim on Trade Secrets*. Any information used in a trade or business in secrecy that is not generally known and that is useful in competition can be a trade secret. Computer software can be a trade secret if one takes reasonable measures to keep the program code and documentation secret. Such measures include restrictive covenants against disclosure in employment agreements, guards at offices, logs recording the location of protected documents at any given time and safes to store copies of documentation and programs.

Milgrim warned, though, that the government

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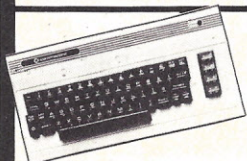
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OUTLOOK

can disclose software to persons who request it under the Freedom of Information Act, and that one should be careful to limit disclosure of program source code and documentation or to provide adequate relief in the government contract for damaging disclosures.

Computers help students get shot

Remember record-keeping in the school you attended? At the beginning of each school year, you'd see platoons of kids helping a few frazzled administrative workers to assemble and reassemble student records.

Times have changed. One example of such a change comes from West Side High School in Manhattan where Norma Lugo, an educational assistant, gets kids shot. Lugo had been informed that New York State's Department of Health wanted all students who had not been immunized out of the schools.

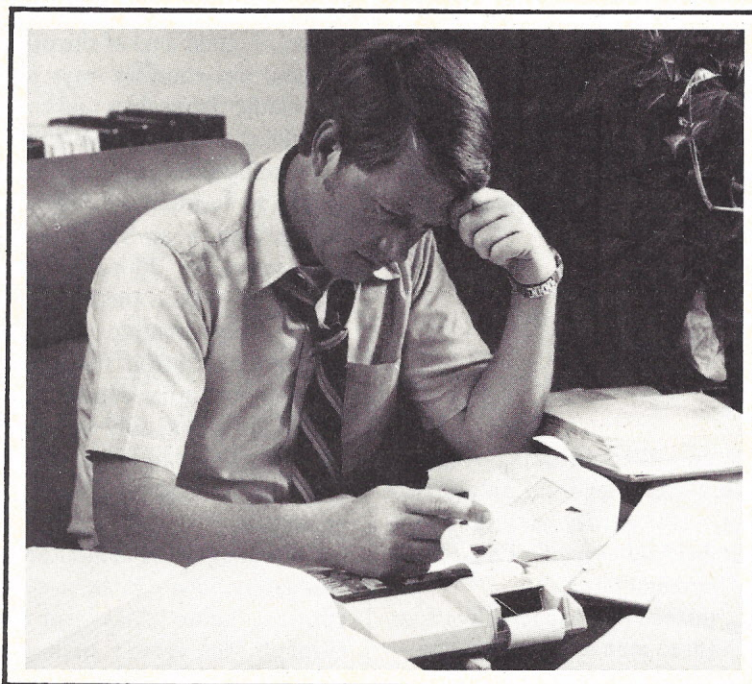
Unlike many other schools in the city, West Side used Commodore computers with Jinsam data-base management software from the Riverdale, N.Y.-based Jini Micro-Systems. These helped school administrators find those students who had not been immunized.

Each New York school had to go through each student's records, assess each student's immunization history, inform students as to the shots they needed and when, and then produce reports. These reports were produced by class for teachers, by grade for counselors and by school for principals and boards of education. Special reports for county and state educational and health organizations were also compiled.

Lugo says that it took her and an assistant only two weeks to complete these tasks. She also says that a larger school in New York took two months to complete the job, and that was using six people. After the reports were presented, they were rejected and a staff was hired to do them again this summer.

Using the computer, Lugo added information as it came in, and the data-base program integrated it into current records. But Lugo couldn't just push a button and generate the needed data. A code had to be designed for new information, and space had to be added to the existing Jinsam student data base. The data base could then collect student's shot records, and feed appropriate information to the

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CIRCLE 40

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The Transformation People

CIRCLE 49

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OUTLOOK

founder of St. Benedict's 26 years ago. "Then I learned programming—in those days you had to write practically all your own software—and the next obvious step was to develop a program for managing our new breeding cattle."

After the program, called Beefup, was written, the decision to try to market it was a natural one for the monks. The monastery has a habit of squandering none of the talent of its members. The monks have merchandised themselves as wedding photographers, audio technicians, songwriters, movie makers and other diverse specialities—and now they're software providers. They followed Beefup with a second program called Pedigree, for annotating the family history of livestock.

While customers for the animal husbandry programs have not beaten a path to the monastery with the persistence of stampeding cattle, the monks expect this to change when they hook into an adequate distribution chain for the software, something they hope to accomplish in the near future.

Beefup, which can be used by both commercial beef-cattle producers as well as purebred breeders, provides a manageable list of cow and calf performance data. The program covers nine data listings including a cow's lifetime report (age, number of calves she had at last mating, which bull was used as stud, weight of calves at birth, pregnancy check dates, etc.), nursing information and a performance list of the calves (weaning dates, birth date, sire, etc.). The program keeps track of as many as 999 cows. Field entries are kept simple—ID numbers and weights, "Y" for an affirmative pregnancy check and so on.

Beefup, with a manual, costs \$500 and comes on an 8-inch single-density floppy disk.

The other program developed by St. Benedict's, Pedigree, maintains and constructs up to five-generation annotated pedigrees of any type of livestock. Breeders can realize two kinds of advantages from this program. First, the information furnished by Pedigree helps in the planning of matings and refreshes a breeder's memory as to the ancestry of any animal in the herd. Secondly, Pedigree is a sales tool. Using a printout, the breeder can show prospective buyers a complete pedigree of any animal he is contemplating purchasing, and this printout can immediately be given to the buyer, even before official papers are processed.

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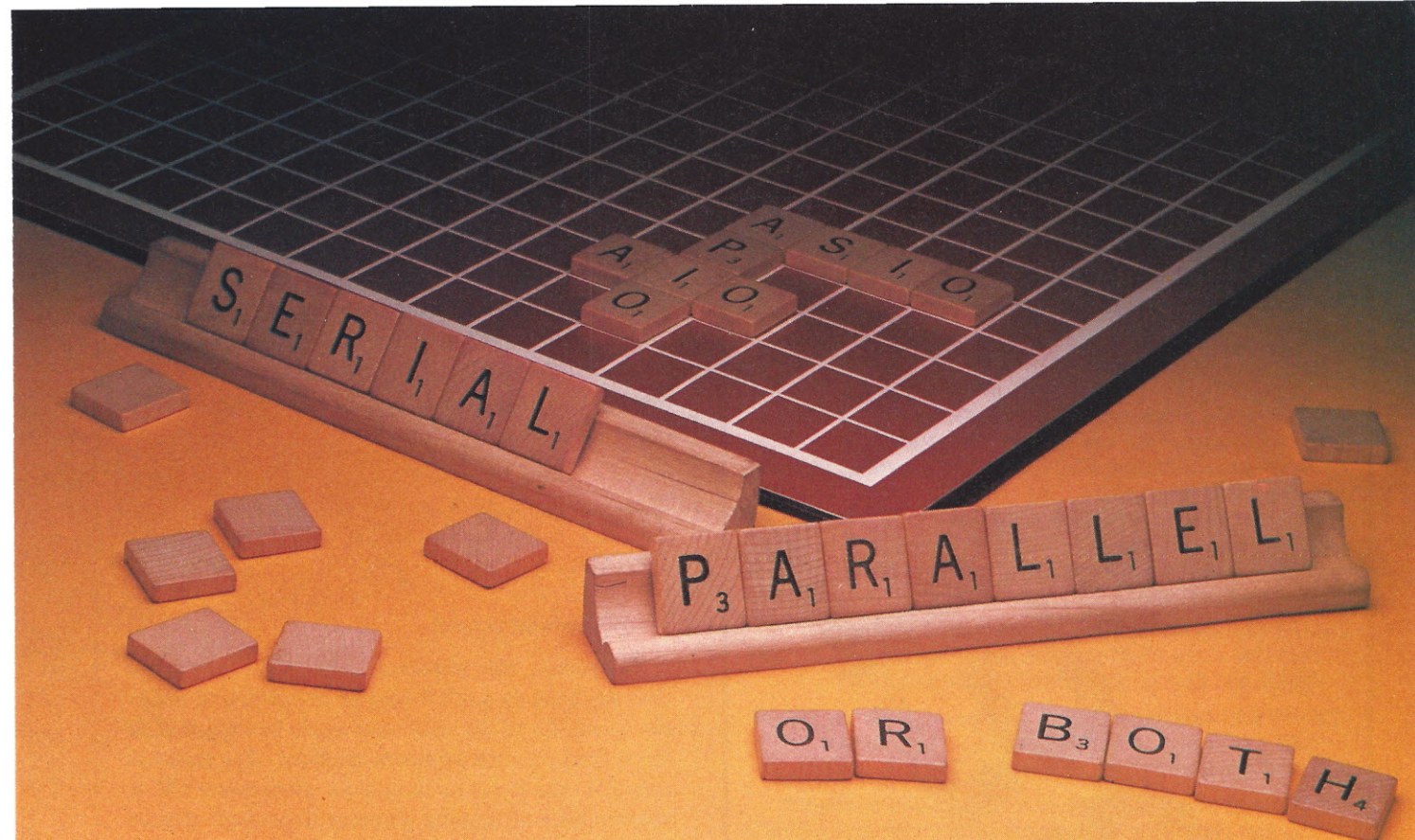
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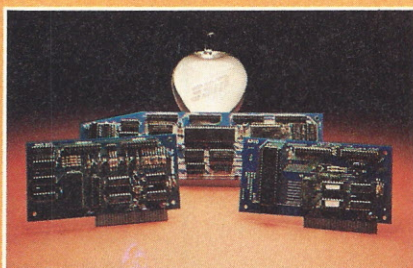
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The cable connection

Margo Downing-Faircloth

Television, the irreverent electronic invention that has been on a roller coaster of praise and rejection since the 1920s, may once again be regarded as more than an entertainment medium. The alternative this time is not as limited as educational TV, a continuously struggling industry dependent almost entirely on donations and public funds.

What is about to unfold is purely commercial, but has the potential to radically change the way Americans, think, work, learn, buy, sell and communicate. Families throughout the nation will soon be able to view banking transactions, do comparative shopping, read articles from newspapers and magazines and read mail—all on their television sets. And they will even be able to converse with people all around the country. They will be able to see their budgeting on the television, actually turning the TV into the display part of a computer terminal.

The ability to do these things is now available primarily to personal-computer users. But by next year in the Philadelphia area, and as early as January on the West Coast, that privilege will be open to anyone who subscribes to cable television.

So many cable companies are interested in making these services available that industry experts now say the potential market is at least 23 million households.

Cable subscribers in Park Cities, Texas, already use their televisions to retrieve information such as the latest stock-market reports, financial reports in the *Wall Street Journal* and updated Dow Jones averages. Cable subscribers in Park Cities can also read the latest weather reports and stories about sports, says Richard Levine, editorial director for the Dow Jones News Retrieval Service based in Princeton, N.J.

Levine says that those subscribers will also have access to an encyclopedia which will be updated regularly, a local newspaper and several other infor-

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CIRCLE 48

OUTLOOK

mation sources. Dow Jones, one of several information utilities, was the first to make its services available over cable television. Other information utilities involved in the cable connection are CompuServe, based in Columbus, Ohio, and The Source, with home offices in Charlotte, N.C.

The Dow Jones service is presently the most expensive, but plans are underway to bring the cost down to a \$12 monthly fee for unlimited use of its major data bases, Levine says. He also says that currently one of the least expensive rates is the leisure rate for home users at \$12 hour.

Comcast Corporation's cable communications division recently entered into an agreement with CompuServe to provide many of the network's services to the 185,000 subscribers nationwide. For about \$150, most information services provided by CompuServe will be available on a test basis to cable subscribers in the suburban Philadelphia area, according to Thomas J. Polis, Comcast's vice president for systems development.

Although Polis says a minimal flat fee will be added to monthly cable bills for the service, he says he is not certain what the rates will be, because they are still being negotiated.

For the present, information from CompuServe can be received only by a computer via a phone line. An inexpensive modem already exists in this instance to convert the electronic impulses sent from CompuServe's computers through the phone lines into something readable on the computer screen.

The cost of these computers ranges from \$500 to about \$2000, with additional costs of up to \$350 for the modem and from \$4.25 to \$25 for each hour of use, depending on the time of day.

But industry observers predict that more people will be able to afford this access to information: "It will open the doors to the mass market," says Al Keener, national accounts manager for CompuServe.

The services offered by Dow Jones and The Source are different from CompuServe's, because the communication is one-way, according to Tom Hawley, director of cable services for The Source. "We're suggesting to cable operators that a finite number of screens or pages of information, ranging from 100 to 5000 pages, be pumped into a continually rotating mode down the cable," he says.

Hawley says The Source will eventually go "two-way," but a larger keypad with letters and numbers will be required. He says the cost to the subscriber for the one-way system will range between \$3 and \$7 a month. That cost will be added to the monthly cable television bill.



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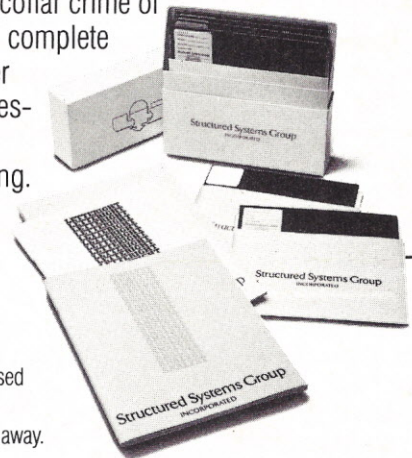
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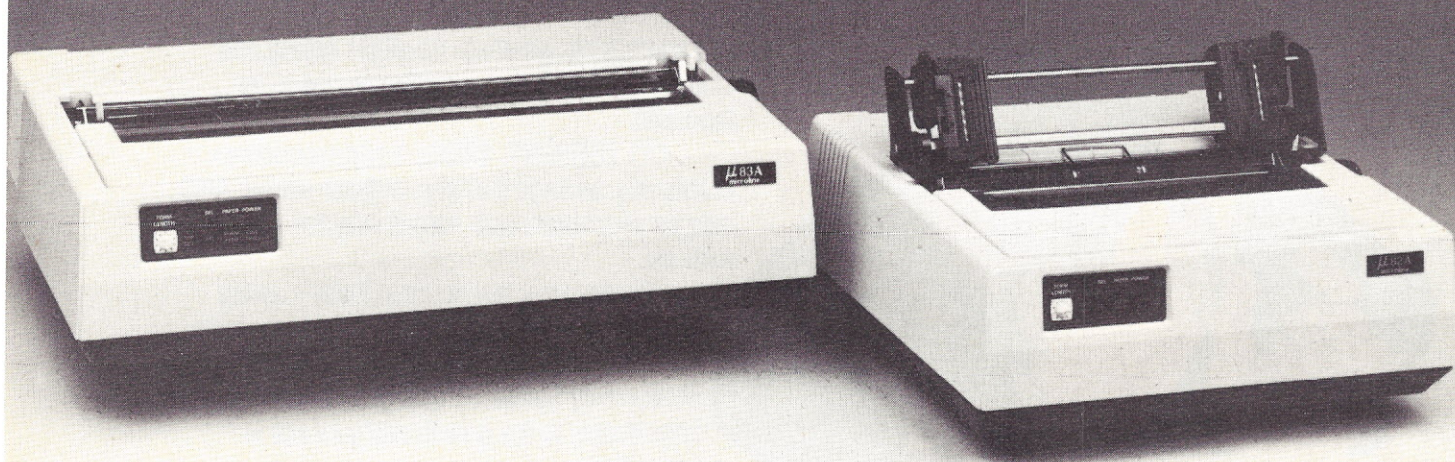
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CIRCLE 47

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Print technique	Bidirectional	Bidirectional	Bidirectional
Dot matrix	9 x 9	9 x 9	9 x 9
Character set	Full 96-character ASCII	Full 96-character ASCII	Full 96-character ASCII
Graphics characters	64 block characters	64 block characters	64 block characters
Interface			
Centronics 8-bit parallel	Standard	Standard	Standard
RS232C (1200 bps)	Standard	Standard	Standard
Size (inches)	14.2W x 12.9D x 5.2H	20.2W x 12.9D x 5.2H	20.2W x 12.9D x 5.2H
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Power	100, 115, 220, 240 VAC 50 or 60Hz	100, 115, 220, 240 VAC 50 or 60Hz	100, 115, 220, 240 VAC 50 or 60Hz
Two New Features			
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CIRCLE 94

OUTLOOK

Computer chess: test your skill

Editor's note: There appears to be a growing addiction in some circles to computer chess, as evidenced by the volume of mail we receive requesting that we cover this area of computer use. While we are aware that not all of our readers are addicted, we will feed the habit of those who are whenever we can.

Any readers who wish to submit computer chess articles or information should send same to Leisure Editor, Personal Computing, 50 Essex St., Rochelle Park, NJ 07662.

A prominent computer game product presently on the market is Texas Instruments' Video Chess for the TI-99/4 personal computer. The product is designed for the beginner to the intermediate-level chess player.

There are various options for choosing the desired computer skill level, the approximate maximum time you would like the computer to "think," the computer's style of play and your choice of color. In one mode the computer program can play up to nine games simultaneously. You may also set up two- and three-move mate problems, and you can ask the computer to solve the problems.

Specific board positions can also be saved on a cassette, and later you may load the positions back into the computer memory from the cassette.

To see the program in action, I decided to challenge the computer. I chose the intermediate level (the

highest) for the computer's play, 40 seconds (the range is 30 to 200 seconds) for the approximate maximum thinking time for each computer move, and an aggressive style for the computer's play. I then elected to play the black pieces. One must play the black pieces from the white side of the board, which is awkward, but it's a minor difficulty.

	TI-99/4	THROOP
1.	P-QB4 (a)	P-K4
2.	N-QB3	N-KB3
3.	P-KN3	P-Q4
4.	B-N2	PxP
5.	P-Q3(b)	PxP
6.	QxP	QxQ
7.	PxQ	P-QB3
8.	N-B3	B-Q3
9.	O-O	O-O
10.	B-Q2	B-B4
11.	N-K1 (c)	QN-Q2
12.	N-K4	B-K2
13.	P-QN4 (d)	N-Q4
14.	N-B2	B-N3
15.	P-QR4 (e)	P-KB4
16.	N-B5 (f)	NxN
17.	PxN	BxP (g)
18.	QR-K1	QR-K1
19.	P-R5	P-B5
20.	B-K4	R-B3
21.	QR-N1	P-QN3
22.	P-KN4 (h)	R-Q1
23.	P-N5	R/3-Q3
24.	R-N3	N-B2
25.	B-B3	N-K3 (i)
26.	R/3-N1 (j)	BxB
27.	PxB	NxP
28.	BxP (k)	N-B6 ch.
29.	K-R1	NxB and wins (1)

The game is shown in figure 1. In this figure I have chosen certain moves on which to comment. These are indicated by a lowercase letter in parentheses following the move.

At the beginning of the game, the computer chose the (a) move. In some experiments after the game, it chose this opening five out of 14 times. The computer's (b) move lost a pawn. Q-R4 ch. would win the pawn back. At move 11, the computer chose (c), but P-Q4 would have been better. After move (d) I was planning to play N-B4. (I wonder if the computer "knew" this?)

The attack made in (e) with a minority of pawns on the queen side, couldn't really succeed, and move (f) lost a pawn. With my (g) move, black was then two pawns up with a stronger position. At move 22, the computer chose (h), which was a weak move. My (i) move was a definite error. White could then play BxP and regain one pawn. The computer followed with (j), but should have played BxP. Later, after move (k), the computer lost the bishop. Finally, at move 29, black was a bishop and two pawns ahead, had a better position on the board, and won the game.

All in all, playing against the TI-99/4 was a lot of fun. I should also mention that the screen graphics are quite good, making it easy to follow the board position. Any beginning to intermediate chess players with a TI-99/4 personal computer, should enjoy this Video Chess product.

MICRO

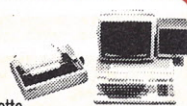
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Printer generation evolves

The Printstation 350 series, a new generation of industrial-grade matrix printers, is designed to be the "one-printer solution" for data-processing, word-processing and business-processing applications.

According to Neil Kleinfeld, Centronics' vice-president of marketing, planning and business management, "The key aspect that sets the Printstation 350 Series apart from other peripheral products on the market is that Centronics offers in a single unit, all the functions required to perform the varied applications within today's office environment. Features that were options in the past are now standard on the Printstation 350, eliminating the need to purchase several specialized printers to handle different types of forms."

A standard feature on all models is a paper handling flexibility that accommodates cut-sheet, fan-fold and (immediate tear-off) "demand-document" forms. Reliability and low cost are possible through a modular design concept which incorporates fewer moving parts, in addition to an operator-replaceable printhead and a 10-million-character long-life ribbon cartridge. Designed as a universal machine, eight resident character

sets are included along with 110 or 220 volt operation for international use. There are also switchable serial/parallel interfaces.

Additional standard features include pin-addressable graphics, 200 cps print speed, self-test/diagnostics and bidirectional logic-seeking printing.



The series consists of three models: the 350, 352 and 353. Printstation 350 is the "building block" unit based on a bus interface architecture, requiring either a customer- or Centronics-designed formatter and control panel. The 350 encompasses all standard features and can be "customized" by OEMs to suit customer's specialized electronic requirements.

Printstation 352 is designed for 200 cps data-processing quality printing, making it ideal for small-business systems, distributed-processing and communications applications. It combines all the standard features found on the 350 plus a basic communications formatter which has electronic switch-selectable functions to satisfy many data-processing and office applications.

Printstation 353 is a multifunction unit with the added ability to perform high-resolution printing. It uses a multipass capability at 50 cps for word-processing applications in addition to the 200 cps data-processing mode. The 353 combines all the features found on the 350 and 352 plus an operator-programmable control panel for feature selection via a liquid-crystal display. In addition to the standard character sets, the Model 353 has the capability of accepting a user-defined character set via the host computer.

The price for the Printstation 352 is \$1795 and the price for the 353 is \$2495.

For more information: Centronics Data Computer, Hudson, NH 03051; (603) 883-0111. **CIRCLE 200**

PERIPHERALS

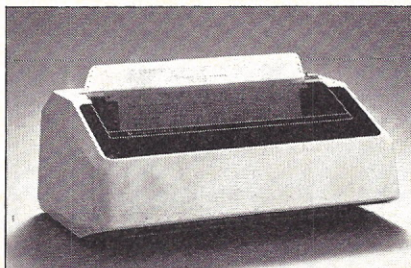
Color Graphics Printer

The Prism Printer is a 132-column dot-matrix printer that will produce eight colors using a four-band ribbon which carries the process colors of cyan, magenta and yellow as well as black.

The printer offers semi-automatic cut-sheet feed. The operator simply inserts an 8½" x 11" sheet in a slot at the bottom of the printer. It is then

automatically positioned by the printer for high-throughput printing.

Another innovation is a high-speed data mode. In the normal (correspondence) mode, the unit prints overlapping high density (24 x 9) matrix



characters at up to 150 characters-per-second, bidirectionally. The high-speed data mode enables the user to select a standard-density matrix and output large volumes of data at print speeds in excess of 200 cps.

Standard features include proportional spacing, enhanced (bold) text printing and standard print densities of 10, 12 or 16.7 characters-per-inch. The printer prints a full 132 characters-per-line at 10 characters-per-inch.

The price is \$1995.

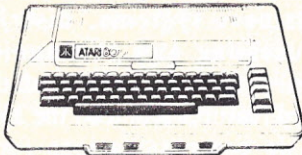
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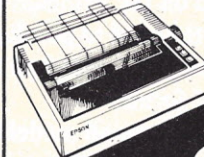
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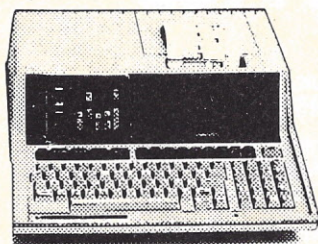
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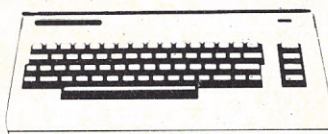
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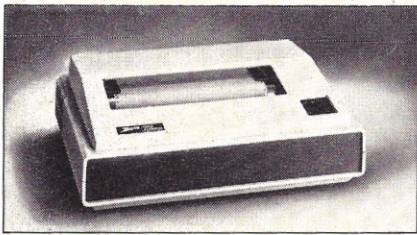
HARDWARE UPDATE

Data Systems, Milford, NH 03055; (603) 673-9100. **CIRCLE 201**

Dot-Matrix Printer

The Z-25 is a dot-matrix line printer that prints in excess of 150 characters-per-second and at speeds up to 300 lines-per-minute. It interfaces with most standard personal-computer systems using serial RS-232-C or 20mA current loop.

Features of the new printer include an inked nylon cartridge ribbon to make ribbon replacement clean and easy, a 9 x 9 dot matrix, a 96-character ASCII set consisting of upper- and lowercase plus 33 graphics characters, character width selection of 10, 12, 13.2 or 16.6 characters-per-inch.



Light emitting diodes on the control panel indicate if the printer is on, if it is on-line with the computer, or if it is out of paper, jammed or has the cover open.

The price is \$1595.

For more information: Zenith Data Systems, 1000 Milwaukee Ave., Glenview, IL 60025; (312) 391-8181. **CIRCLE 202**

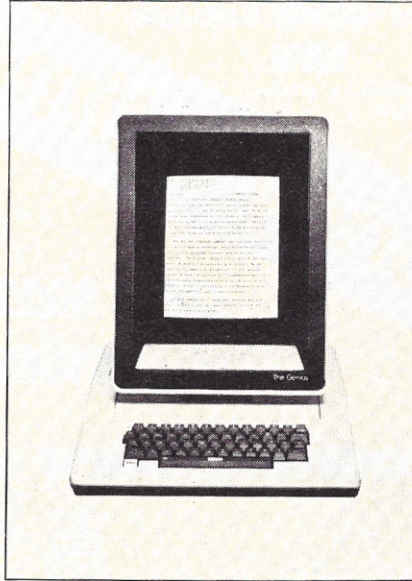
Full-Page Display

The Genius is a full-page CRT display terminal that is Apple compatible. It was developed for the office automation industry, applying to word processing, data processing and software development.

The 15-inch screen displays 57 lines of text by 80 characters across, and optionally, 66 lines by 80. The system is fully compatible with WordStar and other packages including CP/M-based programs.

For software development, the sys-

tem can display large sections of code at one time for editing and debugging. The high-resolution display has an 87 MHz bandwidth and 6k bytes of high-speed buffer memory to refresh the screen.



An Apple interface card is standard with The Genius which is priced at about \$1795.

For more information: Micro Display System, 514 Vermillion St., Hastings, MN 55033; (612) 437-2233. **CIRCLE 203**

VDT and Printer

The Model 1500 video display terminal and the Model 630 letter-quality printer are designed to be used in data-processing and word-processing applications.



The general purpose VDT may be used in all types of interactive data

continued on page 121

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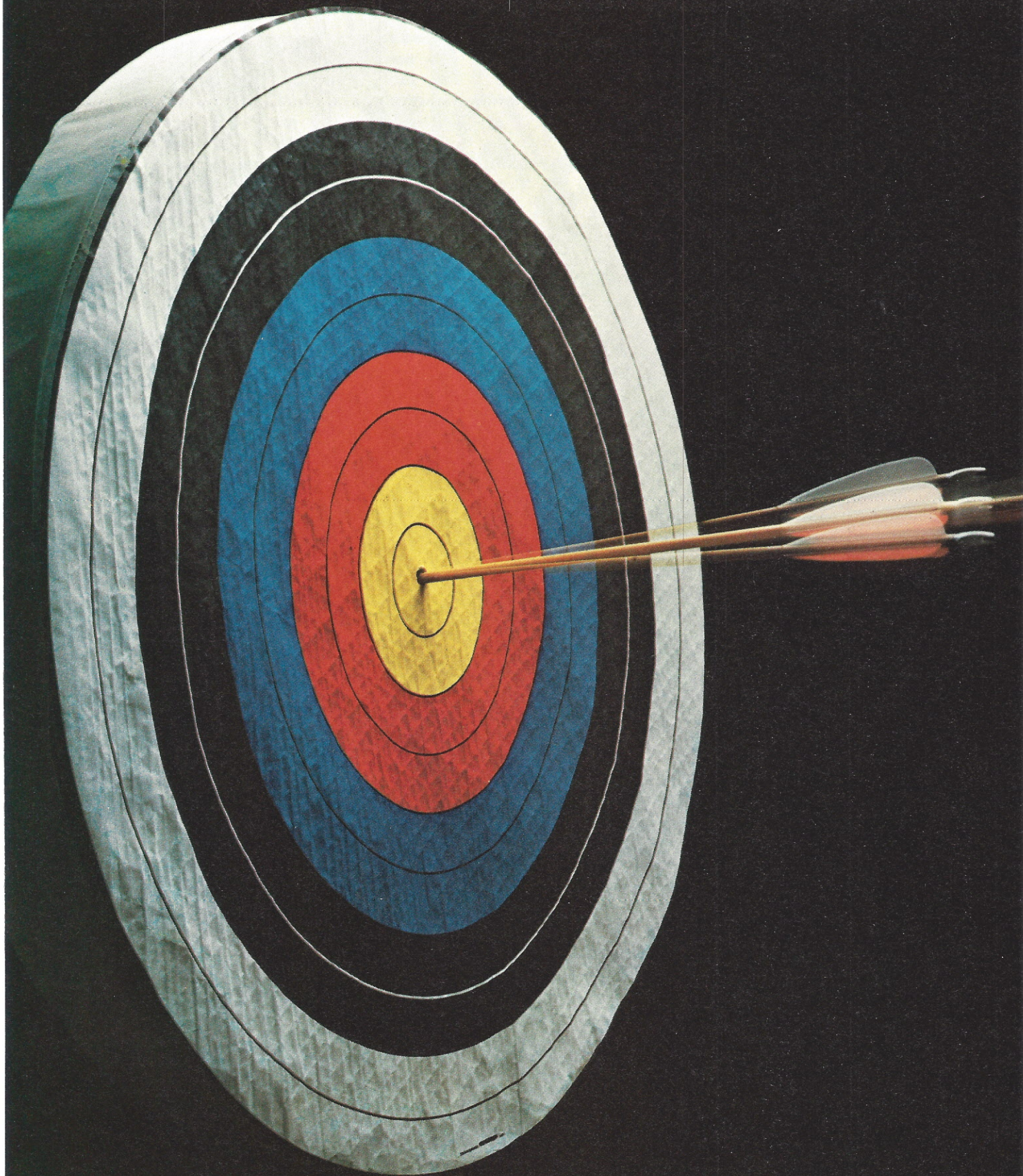


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CIRCLE 56



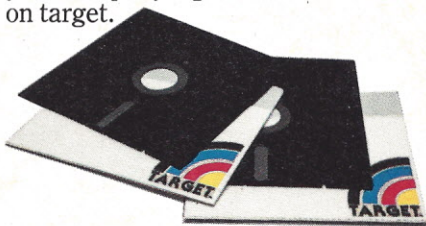
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Crystal has done its best to become the Porsche of the computer game industry. New scrolling techniques, video disk games, a real-life fantasyland — our mad programmers toil onward with little food or sleep to produce some incredible firsts in the microcomputer world. If you are an unappreciated genius and want to join our staff to help create the world of tomorrow today, give me a call. Our magazine *Crystal Vision* will within the next month have a circulation of 80,000 and we look forward very soon to producing our first full length motion picture. I'd like to thank my friends at Votrax and Axlon for giving us the tools (128K RAM for Atari and a vocal text synthesizer) to truly produce some programming miracles.

★ ★ ★ NEW RELEASES ★ ★ ★

THE CRYPT — One evening you awake at sunset to find yourself in what appears to be an endless cemetery. Although defenseless, you must somehow find your way out or perish from the hideous assaults of flesh-eating zombies, rats, vampires, werewolves, and other repulsive monstrosities. To escape you may have to descend into the catacombs beneath the cemetery. This game is a little different from the others of our series because we use a lot of static graphics to set the mood. It is similar in some respects (without any copying intended) to those of our friends at On-Line who produce excellent static graphic adventures. You must use all your common sense and a great deal of courage to escape from this perilous adventure alive. We have made it so nearly impossible that the first player to do it successfully will receive a \$200.00 prize. **\$49.95 2 disks**

QUEST FOR POWER by Mark Benioff — An extraordinary game with the adventure and magic of Arthurian legend. Join Galahad as he leaves Camelot in search of the Scroll of Truth. Explore the treacherous depths of the Caves of Somerset, visit the medieval city of Essex. Along the way you will meet powerful wizards and great prophets. The villages of Sunderland and Leeds dot your path. Somewhere in an evil castle called Skenfirth, lurks the devil himself, while the Evil Giant Gogmogo, hungry for human prey, roams the forests. In Fantasyland tradition we include 64 full screens of hires scrolling and some sensational graphic and animation sequences. Well worth the **\$39.95 1 disk**, enjoyable to all ages.

★ ★ ★ GALACTIC EXPEDITION ★ ★ ★

The year is 3021, almost 100 years since the expedition to the Sands of Mars has returned. The Starship Herman now rests quietly in the Zikon Museum in New Brisbane. It's nearly 80 years since World War III, the Ames Research Center celebrates its 150th anniversary, and you stand at the unveiling of a truly technological wonder — the first ion-propelled vessel, saucer-shaped Lady Joanne, its viewport of pure diamond, its hull of synthetic emeralds. The Martian glyphs of the Meshim and those of Lemuria have now been deciphered and it appears that a much greater mystery is about to unravel. 7 planes and 7 doors — 7 guardians and 7 candles. 7 strange new worlds await the ultimate adventurer to unlock a timeless secret. The starship may seem strange and unfamiliar to our veteran adventurers, faced with its marvelous new technology; this craft must be flown by constant monitoring of ion stabilizers. During your galactic expedition you are surrounded by the flickering heavens, beset by meteor showers and time-warps. Each unique world holds one of the 7 keys to unlock the Great Mystery. The games all run off the Main Module which also is a game unto itself.

From Earth to Moon — On the Moon's dark side lie entrances to caverns extending to the moon's hollow core which contains a timeless secret. Here live a race of burrowing creatures, who have built vast earthen cities with storehouses full of precious stones. Gravity is extremely critical and you must use all your skills to manually land your craft. This first Master Disk contains the dos needed to run additional scenarios. Its price is **\$39.95** and includes 64 screens of hires graphics.

Mists of Venus — On Venus' ever hot surface are endless jungles and swamps. The air is unbreathable and spacesuits and oxygen must be carried. This world is especially treacherous with all sorts of loathsome creatures and hardly any place dry enough to land your ship. Beneath the green seas our adventurer may find the second key to solving the Mystery. **\$29.95** (must have Master Disk to run)

Planet Herman — It is hard to tell where Herman's atmosphere ends and the surface begins. Much of this adventure will have the feeling of a starship submarine. Navigating around Herman is very dangerous but with a computer on board Lady Joanne it may be just possible. This scenario costs **\$29.95** and needs the Master to run.

The Asteroid Belt — Every play something oids. A combination of the best machine language sub-routines of our new Crystaloids with a fast moving adventure game. Penal colonies, lurking pirates, and some unusual forms of scavenger life exist here. It's difficult to travel in the Asteroid Belt without getting blown up. Perhaps you should find some expert help by rescuing a pilot, who is also a sentenced thief or murderer, from one of the penal colonies. There are places for trading and you may wish to indulge yourself with a visit to the sensual Pleasure Planet. **\$29.95** (needs Master Disk)

Uranus - World of Ice — A freezing place with nights of —200° F. Bring along ThermaSuits, as well as some Laars with which to battle the Grungik, a 12 foot tall relative of Big Foot, fond of human flesh. Uranus also has a secret inner labyrinth with tropical flora and fauna. However, the King of the Ice Planet, Norion may have his own idea about your trespassing. Without proper clothing, weapons and supplies, your stay here may be very exciting and very short. **\$29.95** (needs Master Disk to run)

Jupiter - World of Dwarfs — How would it feel to weigh 300 or so lbs.? A trip to Jupiter should fill you in fast. There is a particularly interesting red spot on Jupiter and a curious set of moons. Picking up some antigravs will help. Landing should really tax your energies. In the Jupiterian atmosphere, you fall fast! Be prepared to use 10 times the normal amount of fuel. Better find the 6th key quickly before your fuel and food are exhausted. **\$29.95** (needs Master Disk)

The Crystal Planet — You will have to embark on this final portion of your expedition ignorant of what you may encounter here on this mysterious planet, excepting that the 7th world holds the ultimate key to winning the contest. **\$29.95** (needs Master Disk)

The Contest — To the Winner with the highest score, who solves the mystery by November of 1982 will go \$5000.00 in cash. Good Luck!

★ ★ ★ ★ ★

GLAMIS CASTLE — According to ancient legend and records this castle is one of the most haunted sites in Great Britain. One Lady Glamis, known to be in league with the devil, liked to send out a destructive demon to harass the townspeople. She finally was burnt at the stake on Castle Hill, cursing as she died all future generations of the Lyon family. Her demon still seems to haunt that spot, murdering the curious who stray up to Castle Hill after dark. The curse stipulated that each succeeding generation would have at least one child, often female, who would be a vampire. When an heir comes of age, there is a secret ceremony in which the heir, his father, and the steward take crowbars and chip away plaster concealing a hidden chamber, known only to them, that Earl Patie used when he gambled with the devil. Another tradition says that a creature, half-man, half-beast stalks the passages in the walls of Glamis to insure the fulfilling of the curse. The mystery, of course, is to determine the location of this secret chamber. Our game, occupying 2 disks, will have as exact a replica of the castle as possible. It's definitely one of a kind! And we will be offering a \$500 prize to the first person daring enough to solve the centuries-old mystery of Glamis Castle. **\$49.95 2 disks.**

Crystal has many other fine fantasy and space games. For a copy of *CRYSTAL VISION* which includes a complete catalog please send \$3.00 to the address below.

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CIRCLE 57

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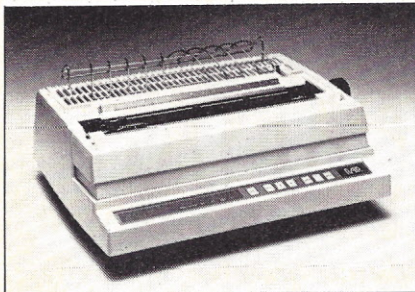
HARDWARE UPDATE

continued from page 116

processing. Its flexibility and operator-oriented features improves the efficiency of both the software and the user, the company says.

Among the key features offered by the VDT are: a 24-line x 80-character display, high-legibility 7 x 10 dot matrix, switch-selectable speeds to 19.2 kilobaud, full cursor controls, a separate numeric key pad, programmable brightness levels and an auxiliary output port.

The daisywheel printer can be used for word-processing applications and printing or producing multiple-carbon sets. It features a range of interchangeable type fonts, graphics capability, variable character and line spacing, and automatic paper handling facilities. The daisy printer mechanism allows the use of both plastic and metal print wheels at speeds of up to 40 cps.



The price of the Model 1500 VDT is \$1225 and the Model 630 printer costs \$2995.

For more information: Rair Computer Corp., 4101 Burton Dr., Santa Clara, CA 95050; (408) 988-1790.

CIRCLE 204

SYSTEM

Instrumentation Applications

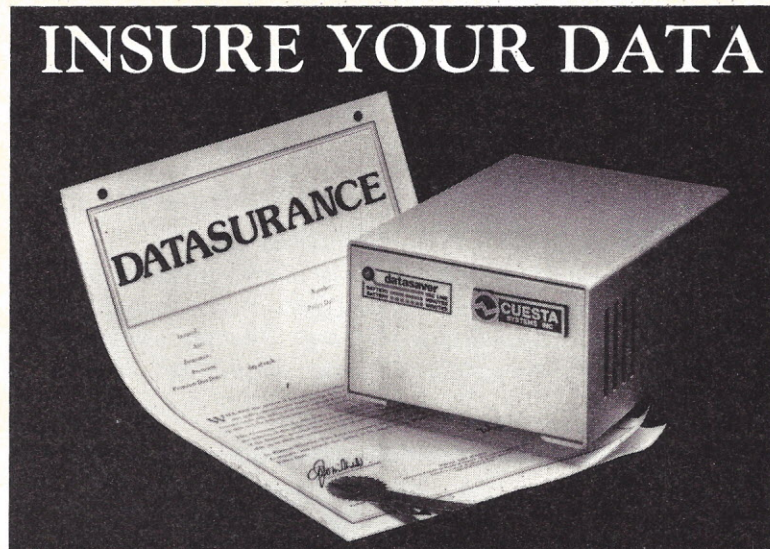
The Model 48 IEEE-488 Bus Controller/Computer System allows fully integrated GPIB (general-

purpose interface bus) control and data processing.

The heart of the system is a 4-layer, single-board GPIB controller that features two independent GPIB ports each with a bus transfer rate in excess of 14k per second. The control-

ler also includes an RS-232 serial port and two parallel data ports.

The Model 48 features a built-in 12-inch CRT with a full 80-by-24 character display. The monitor, which has scrolling capability, features a 25th line for displaying sys-



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CIRCLE 45

HARDWARE UPDATE

tem status as well as the time and date. A standard QWERTY keyboard is used for manual entry of data. Up to 132 columns of hard copy are provided by an optional impact dot-matrix printer.



The system contains 64k of internal memory. An additional 350k of mass storage capacity is supplied by a 5¼-inch floppy disk drive. An optional

second drive can increase storage capacity to 700k.

The Model 48, which contains Z80 and 8085 microprocessors, is supplied with the industry-standard CP/M operating system. In addition, the text editor, assembler and debug software software is provided.

The system is priced at \$5500 and the optional dot-matrix printer costs \$1500.

For more information: Systel Computers, 538 Oakmead Pkwy., Sunnyvale, CA 94086; (408) 746-2901.

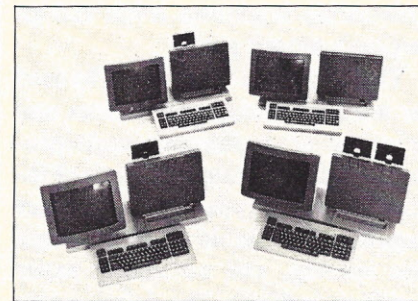
CIRCLE 205

Multi-Function Workstation

The AWS workstation offers a half megabyte of mass storage in a desktop unit. The new computers, based on the Intel 8088 16-bit micro-

processor, offer a combination of mini-floppy and mini-Winchester disk drives mounted on the same desktop enclosure as the processor and display.

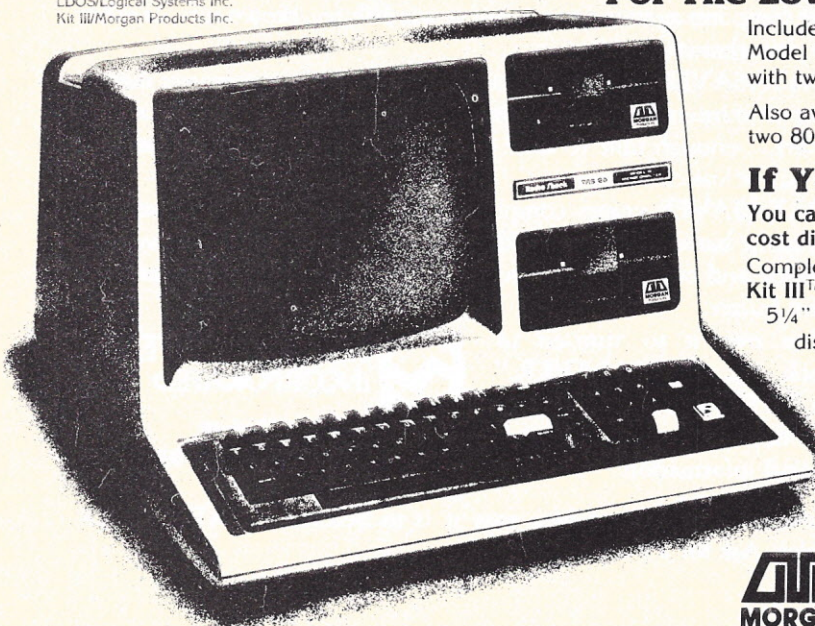
The workstation consists of an 8088 processor, up to 512k bytes of random access memory (based on 64k RAM chips), a high-quality 80-character by 28-line video display unit, and optional mass storage.



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CIRCLE 61

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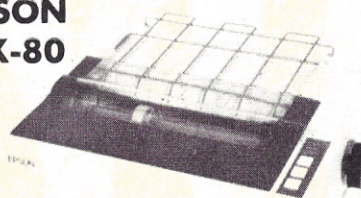
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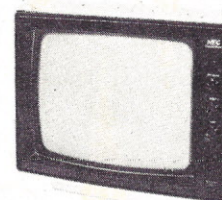


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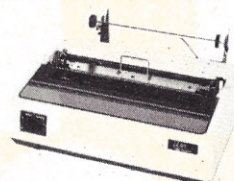
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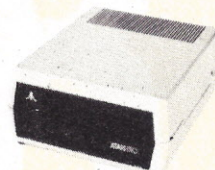
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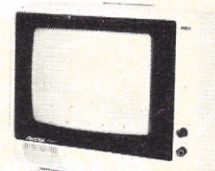
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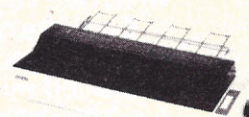
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are on a single printed circuit board. An optional board contains all disk-controller electronics. These elements are packaged, together with the selected disk storage units, in a lectern, mounted on the same pedestal that carries the fully adjustable display unit. Floppy disks are dropped in the top of the lectern "toaster style." The keyboard is detached from the unit and can be placed in any location around the work space within reach of a 5-foot coiled cable.

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Workstation hardware and software architecture are modularly designed to offer selective application entry points and multiple growth paths. A standalone system can be upgraded to a local network without software modification.

The AWS family consists of four members. The AWS-210 supports from 128k to 512k of RAM, has no mass storage devices and may be used only as a cluster station. The AWS-220 supports from 128k to 512k and one mini-floppy unit with a formatted capacity of 315k. It can be used as a standalone system or as a cluster station. The AWS-230 supports from 128k and two mini-floppy units with a total formatted capacity of 630k. It can be used as a standalone system or as a cluster station with local mass storage. The AWS-240 supports from 256k to 512k and a mini-floppy and mini-Winchester unit with a total formatted capacity of 5.3Mb. This may be used as a standalone system, as a master station or as a cluster station.

Pricing ranges from \$3990 to \$11,500.

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HARDWARE UPDATE

within the 32k of memory. No software modifications are required for existing software and the board makes the computer compatible with anticipated disk systems.

The price is \$84.95.

For more information: Computerware, Box 668, 1472 Encinitas Blvd., Encinitas, CA 92024; (714) 436-3512. **CIRCLE 207**

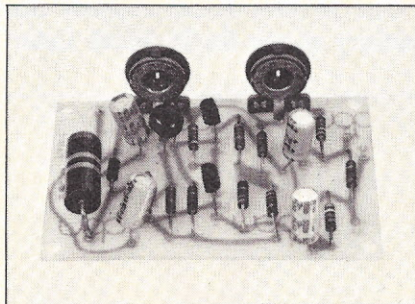
Video Conversion

The ACVM-2 is a receiver/monitor conversion kit that permits operation in either a monitor or receiver mode by selecting switch position.

The kit can be installed in either black-and-white or color sets and permits the user to obtain high-resolution displays of up to 80 characters per line.

It is a direct video modification

which, in the monitor mode, bypasses the tuner and I.F. sections of a conventional receiver set and provides a high quality display.



The price is \$34.95.

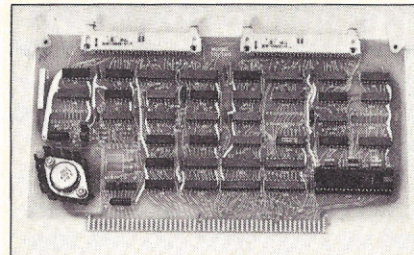
For more information: V.A.M.P., P.O. Box 411, Los Angeles, CA 90028; (213) 466-5533. **CIRCLE 208**

S-100 Bus Interface

The Model TC-100 interface card and implementing software permits the attachment of industry standard

1/2" magnetic tape drives to S-100 bus computers.

The interface is designed to facilitate backup of Winchester technology disk drives with high capacity 1/2" IBM compatible streaming tape drives. It operates on 2 or 4 Mhz systems with tape drives from 12.5 to 125 ips (drive dependant).



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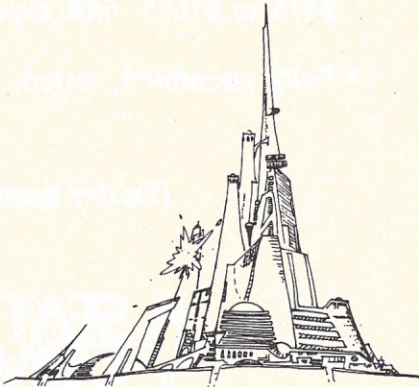
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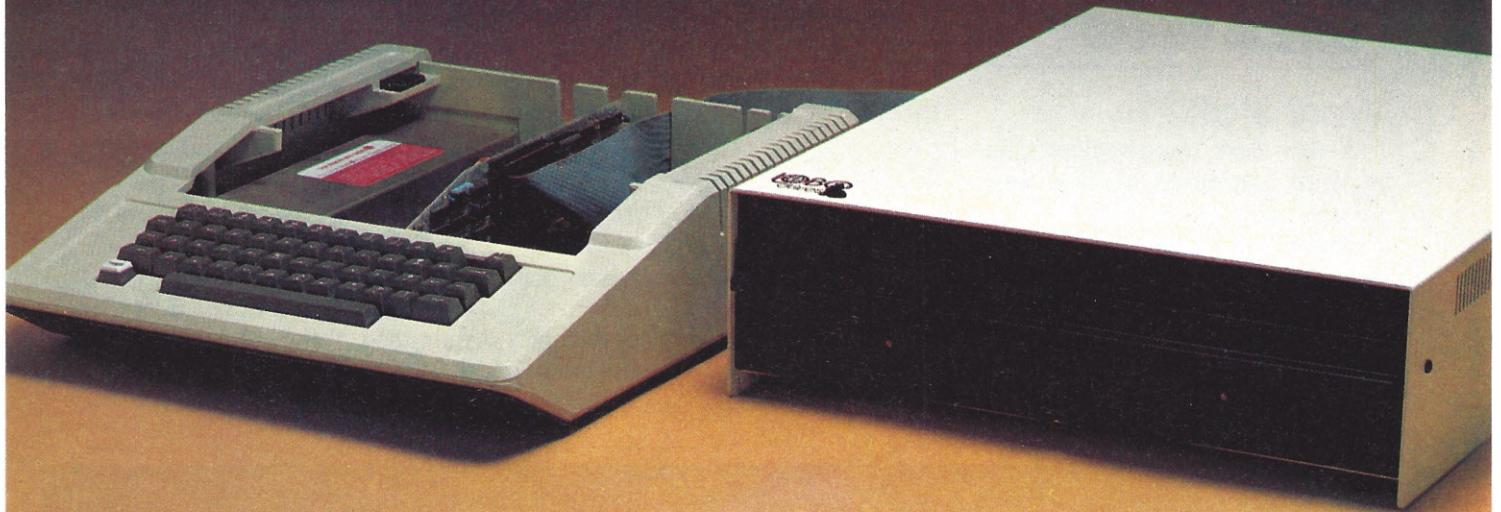
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TRS-80

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CIRCLE 32

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HARDWARE UPDATE

utilities such as a universal tape dump displaying block length, hex and ASCII characters, and file marks.

The price is \$1350.

For more information: Overland Data, 1425 Monte Rico Dr., El Cajon, CA 92021; (714) 447-1908.

CIRCLE 209

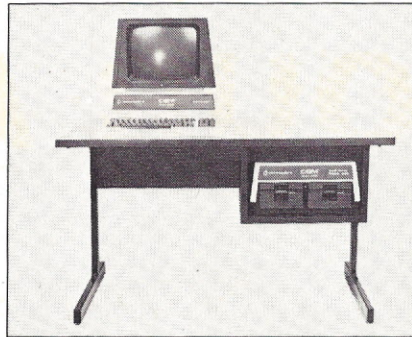
BITS & PIECES

Work Station

A new desk system gives Commodore computer users a comfortable work station. The desks are designed to be ergonomically sound without sacrificing aesthetics.

Four of these guidelines include keyboard height, screen angle, eye-to-screen distance and overall height.

The price is \$299.



For more information: Interlink, Box 134, Berrien Springs, MI 49103; (616) 473-3103.

CIRCLE 210

Music Synthesis

Orchestra-85, a software/hardware product, synthesizes stereo music and provides percussion on the TRS-80.

Stereo separation is by instrument, allowing the user to play trumpet and oboe simultaneously while playing

clarinet and organ. A wide range of percussive sounds and special effects may also be obtained. The software supports five-part harmony for use with 2.66, 3.54 and 4.0 Mhz clock speeds.

Songs are easily transcribed from sheet music using the system's full-screen text editor, or they can be downloaded from bulletin-board systems.

Orchestra-85 includes tape and disk versions plus sample music files on cassette, and an instruction manual. It is fully assembled and contains a tested PC board which plugs into any 16k TRS-80 Model I Level II keyboard or expansion interface.

The price is \$129.95.

For more information: Software Affair, 858 Rubis Dr., Sunnyvale, CA 94087; (408) 295-9195.

CIRCLE 211

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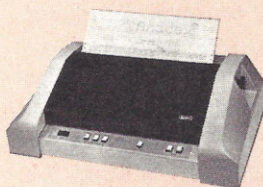


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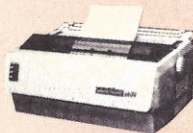


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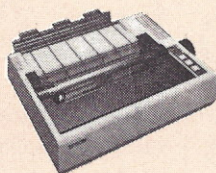


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CIRCLE 64



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Financial analysis and modeling for Apple III

Desktop/PLAN III enables users to do financial analysis and modeling on the Apple III personal computer. The program takes full advantage of the extra internal memory, higher resolution graphics, five-million bytes of hard-disk mass storage, and other features of the recently improved Apple III, according to the software's manufacturer, Personal Software.

Desktop/PLAN III can handle financial models of large size and can automatically consolidate submodels into master models. It also allows flexible report formatting; has on-board graphics; and can incorporate

customized, user-written calculations rules which the master program can use.

The program is menu driven, prompting the user through the process of describing, designing and executing a financial model. It makes use of the Apple III keyboard, 80-character upper- and lowercase display screen and the computer's Sophisticated Operating System (SOS).

Desktop/PLAN III comes with two model files which can be examined and altered by the user: a PERT chart example and a capital-investment sample model. It also

comes with sample files for the fictional "Topnotch Manufacturing Company," with which the user can learn and experiment.

The computer ledger pad has 8000 row-and-column locations. The user specifies the number of columns across, and the program calculates how many rows deep the maximum model may be. Up to 300 columns across may be specified.

Calculation abilities include up to 20 different "custom calculation rules" including program "looping" and if/then logic.

Because the program stores calculation rules, starting values and com-



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And it gives the potential micro user in both large and small companies a reason to turn to microcomputers—a full scale financial support system that's easy to use, readily available, secure, and flexible. In short, a system that doesn't compromise.

Micro-DSS™/FINANCE features:

- Many built-in financial functions—including depreciation, net present value, internal rate of return and amortization.
- Powerful editing and report writing features that make "what if" analysis and financial reporting easy.

An automatically generated worksheet with blanks showing where data are needed to calculate the results of the model.

Built-in graphics with a unique feature—you can retain them for later replay as a "slide show" on the monitor.

Introductory Guide and User Reference Manual written for people with no computer experience.

Model can run automatically once it is set up, so a person with no computer skills can run models and reports someone else has created.

Full user support service

The Apple II Version of Micro-DSS™/FINANCE requiring 48K and Pascal is available now. Suggested retail U.S. price is \$1,500.

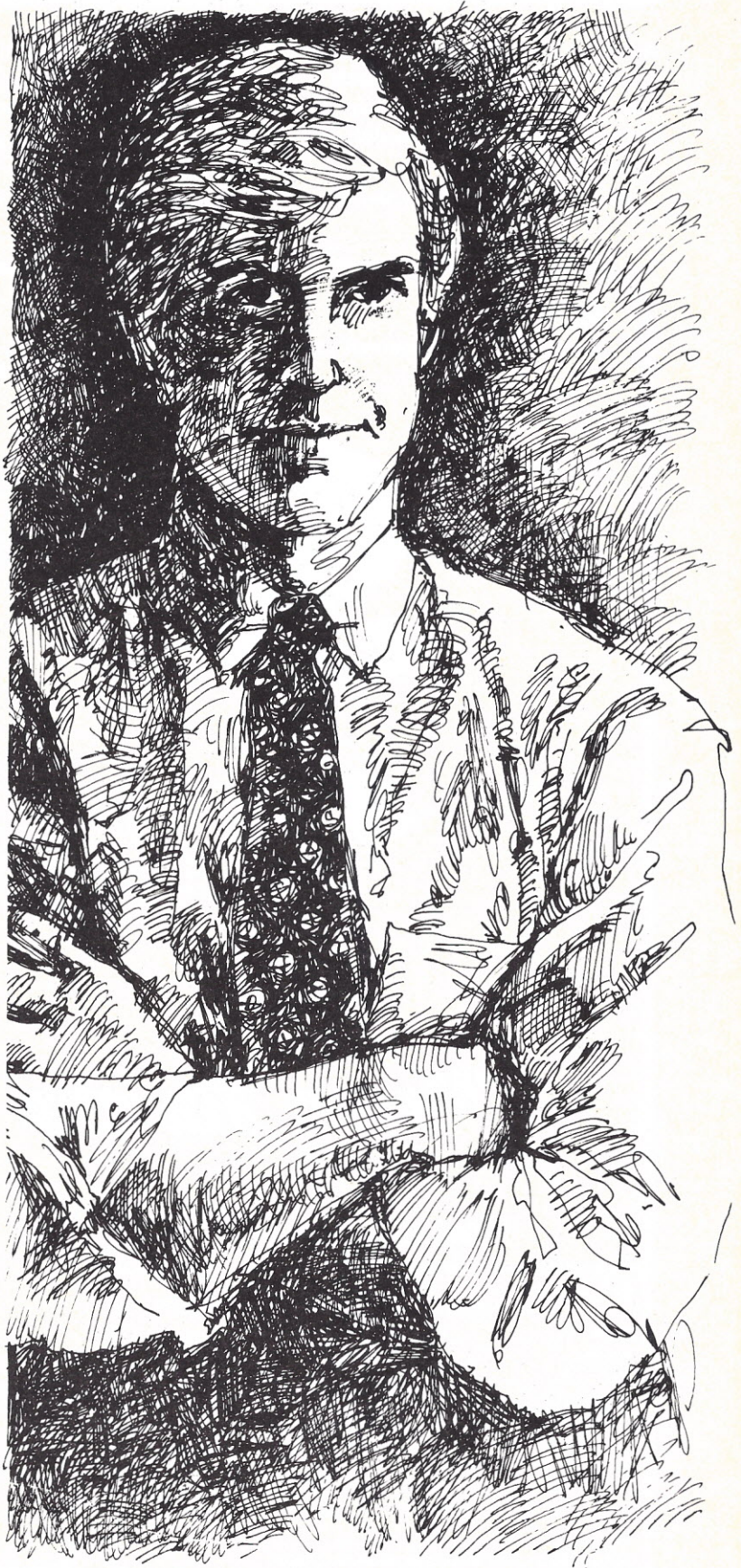
For more information (including a list of dealers near you), please write to:



Addison-Wesley Publishing Company
Software Marketing, Dept. O/P87
Reading, Massachusetts 01867

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Apple II is a trademark of Apple Computer, Inc.



SOFTWARE UPDATE

puted model values on disk, it can consolidate identical submodels into one larger model, and transfer individual lines from other models into a summary model.

In addition to plotting bar graphs

and line charts from Desktop/PLAN III data, another type of graph may be displayed which allows up to four rows of values to be line-graphed and overlaid on a single display.

The program requires an Apple III

128k system, at least one storage device external to the computer, a hard-copy printer and a video display. The price is \$300.

For more information: Personal Software, 1330 Bordeaux Dr., Sunnyvale, CA 94086; (408) 745-7841.

CIRCLE 212

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CIRCLE 31

BUSINESS

Simplifying Budgets

MicroPlan is a financial modeling program developed to reduce forecast and budgeting functions into a 15-minute task.

The program is designed for push-button use and requires no typing skills. Each step in using MicroPlan is similar to computing with a calculator, so no formulas need be entered into the computer. Commands are displayed on the CRT for reference.

Features include: internal rate of return, four depreciation types, three loan types, ability to build interlinked multi-stage models, and a full featured report generator and graphics package.

The price is \$495.

For more information: Data Technology Industries, 700 Whitney St., San Leandro, CA 94577; (415) 638-1206.

CIRCLE 213

Financial Modeling

Bestplan, a financial modeling system, allows the user to describe a financial worksheet in a non-computer type language, and develop complex final reports on a hard-copy printing device.

The software provides full row and column editing and formatting, extended business math functions, including various depreciation schedules, internal rate of return, mortgage schedules, as well as complete labeling and titles along with footnotes.

Bestplan operates under the

OASIS operating system and is priced at \$495.

For more information: Best Company, 30192 Via Borica, Palos Verdes, CA 90274. **CIRCLE 214**

Data Management

The Data Reporter, available for the Apple II using floppy or hard disk drives, includes a database, a report generator, a plotter/analyzer program, calculator capabilities, and a variety of utilities, all designed to work together on common data files.



The software can be customized to particular data storage, access and manipulation requirements. The user can create his own database, inventory control, accounts receivable, sales analysis, bibliography and memo programs. The program's text editor lets the user design and print letters, reports, documents, and contracts.

Data Reporter requires 48k, Applesoft, at least one disk and DOS 3.3. It is priced at \$220.

For more information: Synergistic Software, 5221 120th Ave., S.E., Bellevue, WA 98006; (206) 226-3216.

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EDUCATIONAL

Reading Series

The High Motivation Reading Series of educational products is based on motivational reading materials for grades 4-6, using an illustrated format. The series provides four student readers, a read-along audio cassette, a teacher's manual and a computer program (written in TRS-80 PILOT

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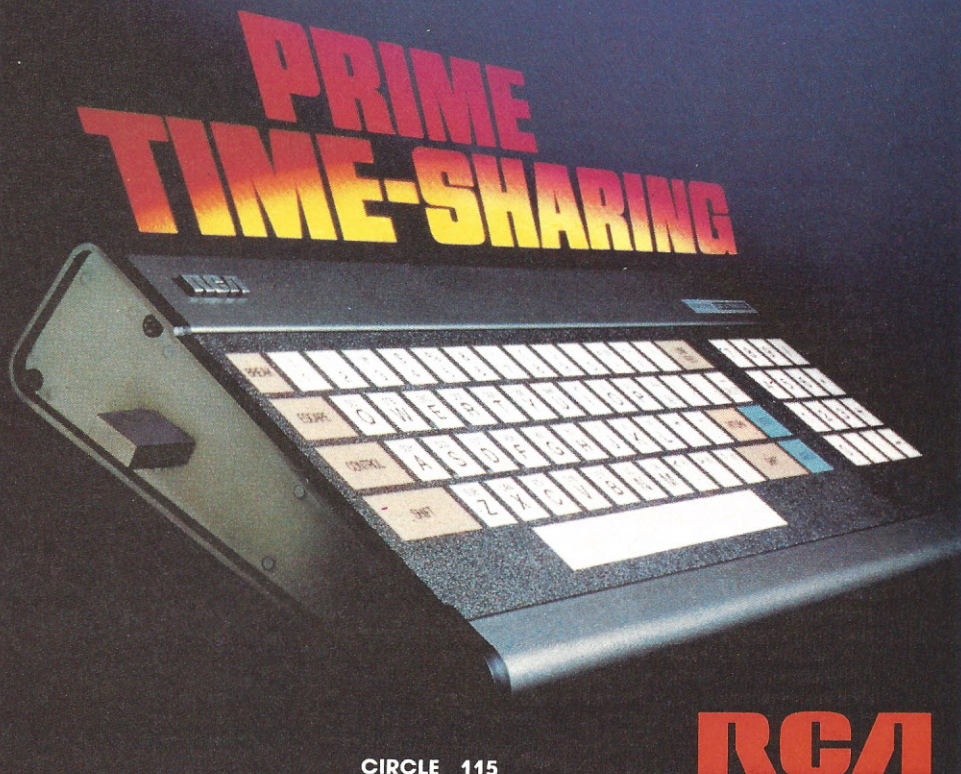
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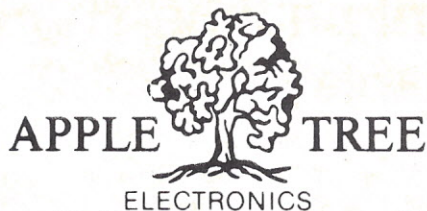
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CIRCLE 115



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CIRCLE 66

SOFTWARE UPDATE

Plus) to measure comprehension in several skill areas.

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Each story involves computer-based activities and gives practice in vocabulary and reading comprehension, including understanding main ideas, sequence of events, details and separating facts from opinion. Test information is recorded for the teacher's review.

The series requires a TRS-80 32k Model I with the lowercase option and at least one disk drive, and TRS-80 PILOT Plus, available for \$79.95.

For more information: Radio Shack, 1800 One Tandy Center, Fort Worth, TX 76102. **CIRCLE 216**

UTILITY

Character Set

A programmable character set and gamegraphics editor on cassette is now available for users of the VIC 20 personal computer.

The character-set editor comes with a 16-page instruction manual and allows users to create groups of 64, 128 or 192 programmable characters at a time and use them in BASIC programs. Each group of characters takes only one-half kilobyte of program space.

With the new character editor, VIC 20 users can create their own character set and easily modify letters, numbers and graphics to include foreign language letters, mathematical and scientific symbols or special "arcade" game graphics.

It also allows users to save their newly-created character set on tape or disk for future use, and then insert the set in a BASIC program.

The price is \$14.95.

For more information: Commodore Business Machines, Computer Systems Division, 681 Moore Rd., King of Prussia, PA 19406; (215) 337-7100. **CIRCLE 217**

Information Management

DataFax is designed to allow the user to enter and access information according to individual needs, without programming.

The program allows the user to enter data in any form and to retrieve it in an individual way, eliminating the constrictions of set programs. Each screen of information can be cross-referenced or categorized by any word or words. Individual screens are retrieved by the keywords. Screens may be chained together if necessary and a hard copy may be obtained.

The program is written in Pascal and runs on the Apple II. The price is \$250.

For more information: Link Systems, 1655 26th St., Santa Monica, CA 90404; (213) 453-1851. **CIRCLE 218**

COMMUNICATION

Communication Lines

Micro-Telegram allows Apple owners to access Western Union services worldwide. Besides sending mailgrams, Apple users can send and

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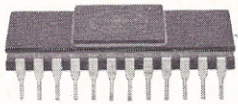
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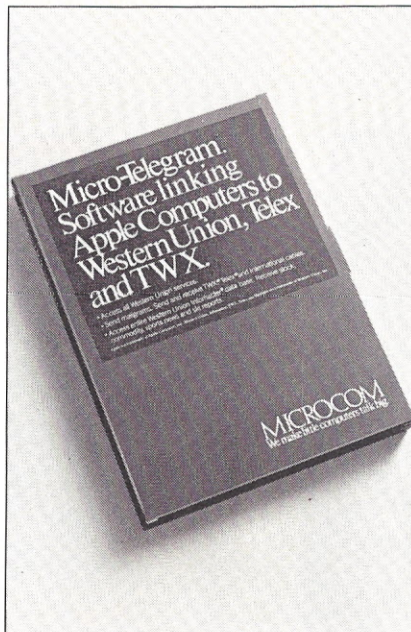
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CIRCLE 68

SOFTWARE UPDATE

receive TWX, Telex and international cables.

The software gives access to the continuously updated reports on news, stock, foreign exchange, gold, futures, sports reports and ski conditions available through Infomaster, the Western Union data base. It also permits editing on the screen, automatic transmission of messages, computer-stored subscriber lists and directories.



The price is \$250.

For more information: Microcom,
89 State St., Boston, MA 02109;
(617) 367-6362.

CIRCLE 219

Information Service

TEXNET, the home information and communications service developed by Source Telecomputing, is now "on-line" for users of the TI home computer. The new subscription service is available over telephone lines coupled to the TI home computer via available TI accessories.

The service offers more than 1200 information services of The Source, plus a variety of new services that take advantage of the color, graphics, sound, music and speech capabilities

of the home computer. In addition, it includes text-to-speech capability that allows users to hear any message typed on the keyboard or transmitted over the TEXNET system.

Equipment required includes the Terminal Emulator II solid state software command module, a solid state speech synthesizer, an RS-232 interface module and the TI telephone coupler.

The cost of the service is a one-time subscription fee of \$100 plus a \$10 minimum monthly charge. The "on-line" charges are \$18 per hour from 7 a.m. to 6 p.m., \$5.75 per hour from 6 p.m. to midnight and during the day on weekends, and \$4.25 per hour from midnight to 7 a.m.

For more information: Texas Instruments, Consumer Relations, P.O. Box 53, Lubbock, TX 79408.

CIRCLE 220

Communications Link

Micro-Link, for the Osborne 1, is designed for the novice computer user and supports communication with bulletin boards, information retrieval services, as well as send and receive files from other computers.

Files may be prepared in advance and transmitted automatically. The entire two-way record of communication may be recorded in memory and on diskette.

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The software requires a Z80 or 8080-based computer system with serial port and standard RS-232 modem. The price is \$89.

For more information: Osborne Computer, 26500 Corporate Ave., Hayward, CA 94545; (415) 887-8080.

CIRCLE 221

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CIRCLE 67

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Experiments In Artificial Intelligence for Small Computers presents programs written in Micro-soft's Level II BASIC to illustrate artificial intelligence experiments.

The book begins with an explanation of artificial intelligence—its scope and problem areas. A short BASIC program that involves moving a chess king on a small chess-board is used to illustrate the discussion.

Problem solving is covered with emphasis on a program that predicts a human player's choices. The author then focuses on reasoning, primarily by means of a program which stores data and makes deductions from these data.

The book devotes a chapter to natural-language processing or verbal communication. An appendix describes BASIC keywords to help make the book's programs more easily translated to other versions of BASIC.

The price is \$8.95.

For more information: Howard W Sams & Co., 4300 W. 62nd St., Indianapolis, IN 46368; (317) 298-5400.

CIRCLE 222

WP Handbook

The Word Processing Handbook is designed for the business manager responsible for the operation of high-technology word-processing systems.

The book is written in a non-technical style to give the reader a better understanding of word processing systems—what they are, what they do, which one to select, as well as the cost of owning and operating a system.

The price of the book is \$17.95

clothbound; \$8.95 paperback.

For more information: Prentice-Hall, Englewood Cliffs, NJ 07632; (201) 592-2640.

CIRCLE 223

Data Communications

Covering the TRS-80, Apple II, Heath H-89 and others, *Micro-computer Data Communications Systems* explains personal computers as data-communications terminals and electronic-message systems.

The book details the operation of modems, terminals, electronic bulletin-board systems, communications systems for the deaf and information utilities such as CompuServe and The Source.

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For more information: Dilithium Press, 11000 S.W. 11th St., Suite E, Beaverton, OR 97005; (503) 646-2713.

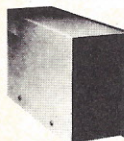
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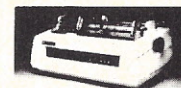


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COMPUTING CONSIDERATIONS

Frustration

continued from page 88

Nevison feels that one interesting thing in learning computing habits—sometimes new to businessmen—is that, “you can’t learn by talking about it. There is enough important detail that the only way you will come to terms with it is by putting your body on the line and *doing it*.”

This view echoes that of Dr. Brothers, who states that, “You cannot avoid frustration. It is inevitable in the process of life. What you can do is learn to handle frustration.” How does Brothers see handling frustration when faced with a new way of doing things, as in computing? “By simply beginning to learn it. And by not setting unnecessary emotional blocks in your way. Avoid frustration by the very process of starting to learn.”

To Nevison, this jumping in is akin to learning to swim. “We can do all the talking we want about strokes, etc. But what’s going to come to mind when you jump in is keeping your head above water a regular percentage of the time. That may have gotten lost in the theory. But all of a sudden, in the practice, it comes back. And the integration of it all is a little bit more than the examination

of any of the pieces.

“Another good cultural analogue is music. Programming is very much like music, wherein a very few elements give you an extraordinary diversity of accomplishment. How many notes are there when you look at all the songs? Similarly, there are five or 10 elements in a programming language—maybe 20 or 30. It’s an oddity of the field actually, that gives you the richness of programming. Nobody would claim from singing a scale that they know how to compose music. You compose music by doing it. You start by making little tunes, then big tunes.

“Now that’s programming. Anyone who believes it’s like composing music can do it, especially if he apprentices himself to someone who knows something about it. Even if you’re the most isolated manager, the best thing you can do is find someone who knows something. He may be a bad “guru,” but a bad “guru” is better than none at all. That’s at least true for the language that gets you on the system, that lets you edit, that lets you load and unload files. I’d do my damndest to find a warm body who understands.”



Tips on temper control

- **In the beginning:** Make sure you know why you’re doing what you’re about to do. By now you should be firmly convinced of the necessity of using a personal computer in today’s world, and of your ability to learn computing. Do a cost/benefit analysis.

- **Find a friend:** Park yourself with someone who knows more than you.

- **On jumping in:** Don’t allow yourself to be overwhelmed. Do allow yourself an initial period of ineffi-

ciency. Prepare your own personal manual as you go along.

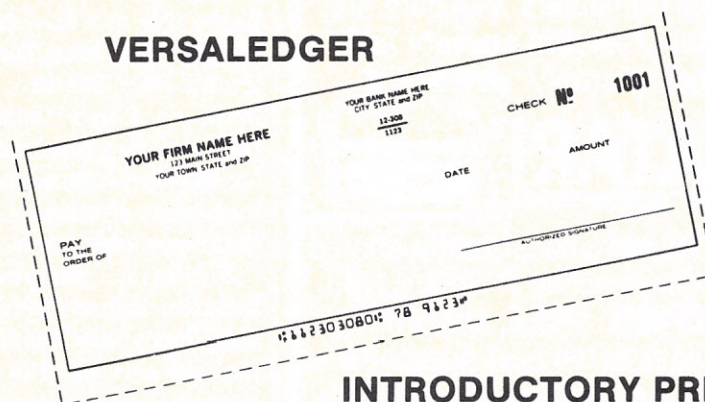
- **On staying in:** Always remember why it is that you’re doing what you’re doing. Your effort will net you increased efficiency, saved time, more dollars and the knowledge that you are on the leading edge.

- **On expanding your usage:** Always bear in mind that you can be doing other things as well with your personal computer. The uses are as limitless as your imagination.

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CIRCLE 70

SPECIAL REPORT

Mass storage

continued from page 74

stored on the tape are not often accessed. Once the data are dumped, en masse, from the Winchester to the tape, the tape can be safely stored and accessed only as needed. Working files can be kept on the Winchester until completed, and then off-loaded onto the tape. This system is effective, but is really only cost-efficient for the larger-systems user; a sophisticated tape-transport mechanism, let alone the cost of the tapes, just runs too high.

For the sake of economy, the industry seems to be settling on the floppy disk as a backup medium for the hard disk. Manufacturers such as Zenith Data Systems, for example, make an 8-inch Winchester with built-in floppy-disk backup that sells for \$5595; the Winchester carries 10 megabytes of memory capacity, and the floppy adds one megabyte.

Similarly, peripherals manufacturers such as Lobo provide hard-disk/floppy combinations. The fact that the new breed of 5¼-inch Winchesters is compatible with the standard 5¼-inch floppy drives makes for a happy marriage of the two.

As a buyer, you should also be aware of the need for backup memory in your system, and figure the price accordingly. The trend seems to be toward a bundled approach, with an integral, or at least compatible, hard-disk and floppy configuration. This will make your shopping easier, but you should be prepared to pay a little extra for a memory backup if you're going to go the hard-disk route.

Compatibility concerns

Compatibility problems also need to be addressed concerning Winchester to CPU interface. The typical I/O port of a personal computer moves far too slow for the typical Winchester, where the disk spins at

around 3600 revolutions-per-minute. Fortunately, peripherals manufacturers provide the appropriate interface for specific machines, and on the systems manufacturer side, any proprietary disk systems will obviously match the CPU. But if you're attempting to mix and match, be careful about interface requirements. Make sure that the hard disk is compatible with your CPU.

Once you've waded through the mire of technical details and have found what you really need, you can then begin to make an intelligent assessment for a mass-storage-device purchase.

Given that you're looking for mass storage as an after-market purchase—that you've been working with your system already—you're most likely in the cassette camp. If you find that you're happy there, and that you don't need more memory or storage for your programming or applications needs, stay put. There's nothing wrong with using cassettes if you don't need anything larger, and you'll save money, too.

A certain percentage of first-time buyers will opt for floppy disks rather than cassette—and here the choices are a bit harder. The cost to upgrade from cassette to floppy is anywhere from \$500 to \$1000, but an upgrade from diskette to hard disk can run \$3000 to \$5000 or more.

What's needed?

The bottom-line question to ask is: How much memory do I need? If you're a free-lance writer who turns out short articles and letters, a floppy-disk system is probably appropriate. If you're the president of an organization, or are running your business with a personal computer, then hard disk may be the only way you can maintain large mailing lists, handle correspondence, cope with ba-

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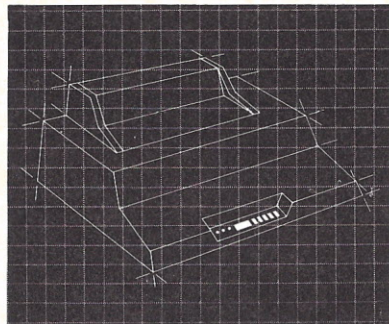
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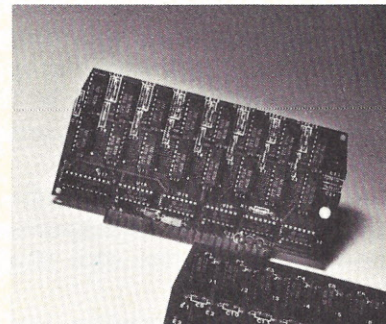
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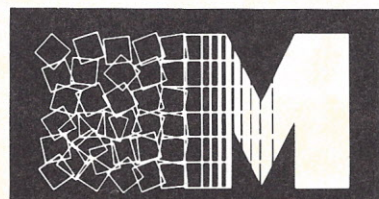
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SPECIAL REPORT

sic accounting functions and perform financial projections. You'll need millions of characters of information to do all that, and only a hard-disk system can get you there.

An added incentive in the area of hard disk is the fact that prices for a typical 5¼-inch hard disk may decline to the point where hard disks become more price-competitive with floppy-disk systems. If and when that happens, the clear choice will be the hard-disk system with its greater memory capacity.

In the interim, all three media—tape, diskettes and hard disks occupy their own niches. But what of the long-term future?

Disk-oriented recording media may not be the ultimate technology. "Bubble memory"—tiny magnetized cylinders contained in a single-crystal sheet—may yet become a viable memory technology. The costs of

producing bubble memories, once hailed as the new wave of memory, soared far beyond any reasonable economic expectations, so most of the firms in the bubble race dropped out.

Lately, bubble has been making a bit of a comeback, because the density of bubble memory allows for a considerable amount of storage. The magnetic bubbles can be manipulated by external magnetic fields for the recording and removal of data. The technology can work, given a reduction in cost.

Another potential mass-storage device is the video disk. While current video-disk offerings concentrate on prerecorded formats, recording capability could become a feature of either the video disk or its new relative, the digital audio disk. The fact that the latter is digitized makes it an ideal candidate for the digital format of computers. For the near term, it is

more likely that audio and video disks will be used for playback of pre-recorded software.

Another potential development in memory is removable hard-disk backup. In the larger systems world, many peripherals vendors offer a combination of fixed and removable hard-disk storage systems; the majority of the memory is in the Winchester enclosure, but several megabytes of memory capacity are contained in the removable tape cartridge. Once the memory has been exhausted in the removable unit, a new one slips into place. This is the same principal used in hard-disk/floppy-disk combination in the current product offerings. But given the trend toward greater memory storage, it is possible that the hard-disk user could well make use of a 5¼-inch Winchester with another hard, but removable, disk. 

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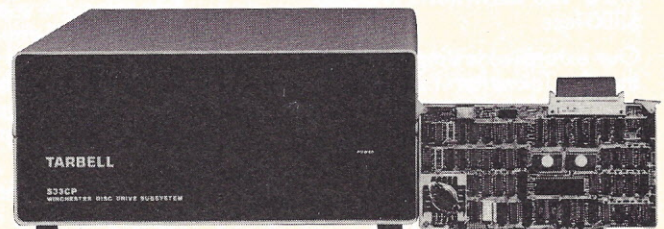
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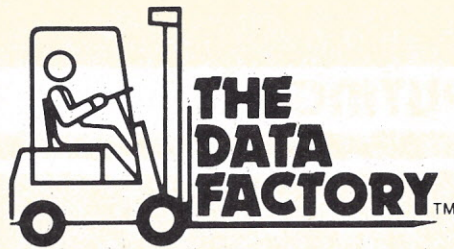
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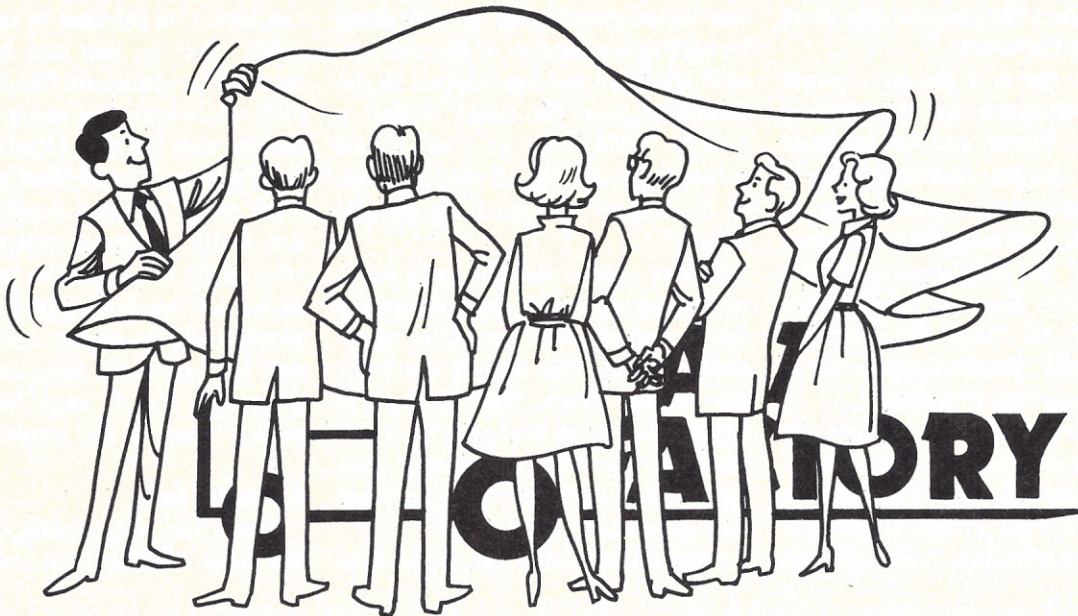
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CIRCLE 82

Purchasing power

continued from page 32

going back and punching numbers in the calculator. With VisiCalc, the computer does the calculations more or less simultaneously."

Lucy Stoner is a business owner who computerized her purchasing procedures. Stoner and her husband own and operate Microperipheral Corp., an electronics manufacturing company in Redmond, Wash. Stoner has one of her employees spending less than five hours a week at her firm's TRS-80 Model II computer, running Radio Shacks's Profile database management program.

Stoner estimates that without the purchasing automation they've started, they would have to hire another employee to work 15 hours per week on their purchasing function, and

Stoner would have to pay about \$12 an hour. That means the semi-automated purchasing system alone would pay for the cost of the computer in less than two years. As it is, the computer paid for itself in half a year. "We use it for word processing—we did all our manuals on it—and we also use it for general ledger."

Stoner agrees that the most natural thing to automate in purchasing is the buying of large quantities of repetitive items. She doesn't use it for low volume items. "But if you are buying any quantity of an item, it will certainly cut your purchasing time and enable you to have better control over purchasing," she states.

Stoner also has high praise for Pro-

file. "We have set up our bills of material and our mailing list on it. You can sort it on thirteen or so different fields (that is, you can have it go through its electronic file cards in 13 different ways). We use it in combination with Scripsit (Radio Shack's word processor) and VisiCalc to keep track of our invoices. A person who is not really computer oriented could very easily use this. The person who set up our purchasing program is not particularly computer oriented and was not extremely familiar with the program. Yet it took her only a month to set up and implement it."

Keeping tabs

Videx Inc. of Corvallis, Ore., went the large MRP-system route, but it

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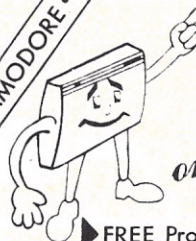
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CIRCLE 84

didn't work properly. Matt Bierek, in charge of purchasing for Videx, then set up Personal Software's VisiDex data-base program on an Apple II,

into VisiDex and the money into VisiCalc. The programs don't merge. That is, you can't pull data from one and put it into the other without re-

"We have a rather large computer available to us in the purchasing department, but it isn't economical to put some reports into the large system. That's why I use our 800."

"to sort of keep tabs on what the other system was doing. It was basically just a card system for watching each part, and it lets us know when to reorder." Bierek would log the quantities

keying it. "It seems like a lot of work when you first think about it, but it goes very quickly because of the organization of the whole thing," Bierek says.

The main benefit Bierek has seen so far is better control of the quantity of parts on hand. The four to six week backlog of deliveries that has held for the past year is being cut down, and this is giving the staff time to upgrade quality control, packaging and documentation. "Because of this tighter control, this more visual display of the data that is so vital to the operation of the company allows us to see things a little farther in advance. Since we have products on hand all the time, we can maintain that production flow. If you lose a part for one day, you cause a week's worth of slip time at the end of the product line."

The MRP system that Videx originally purchased did not work as well as the Apple II for purchasing. After



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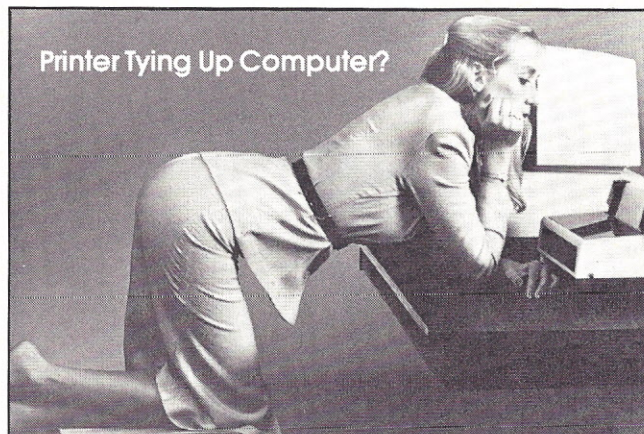
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CIRCLE 89

some careful detective work, Bierek found that the program was buggy. The company scrapped it and sold the hardware. Now they're planning to implement a full MRP system with Apple computers and a Corvus network system linking them to a routing device and a massive main memory.

Currently Bierek has the system semi-automated. He can generate the figures he needs for each aspect of his operation, but he still has to review them manually. When discussing the sizes of companies that would benefit from this kind of system, he says, "Someone with under 300 different parts or 300 separate pieces, and maybe 20 to 30 vendors. It is not so much dollar dependent as it is quality dependent."

One company that went to the ex-

pense of fully interactive, integrated custom-developed software was Cromemco, a Mountain View, Calif., computer company. The company believes that purchasing is one of the less standardizable components of automated data processing. Cromemco has tied together modules for inventory, bills of material, production forecasting, production scheduling, work in process control, finished-goods inventory and purchasing. At Cromemco, purchasing is connected to a true MRP system, coupled with manufacturing planning.

Mike Ramelot, Cromemco's vice president of finance, starts the purchasing process with 12-month and two- to three-month timeframe forecasts. These yield a master schedule. The bill of material comes out of this

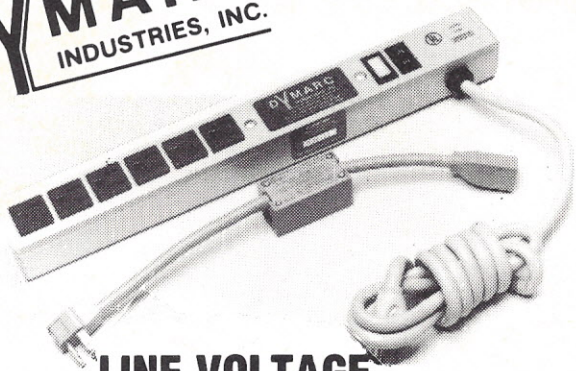
schedule, and the component purchase requirements come out of the bill of material. The one part of this procedure that isn't automated is the lead times, because there's a judgment factor.

Yield, required dates and amount of inventory on hand are automated. Shortage reporting is needed from the floor so buyers can expedite overrides. This is dangerous for an MRP system, and has to be closely controlled.

Cutting costs

From Ramelot's financial standpoint, the goal of all this is to minimize inventory, because it must be financed, and Cromemco prides itself on minimal reliance on outside financing. You also don't want production to stop at any point. Pur-

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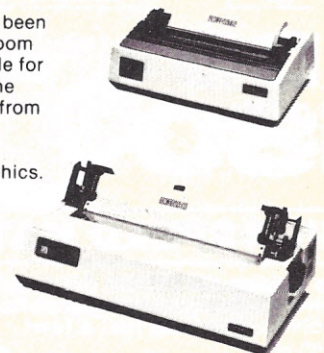
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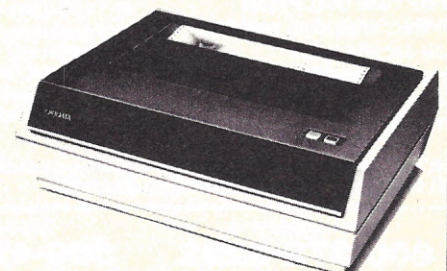
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chasing agents must maneuver between these two points.

Ramelot's opinion about what size companies can use personal computers is any size. He feels that as a firm outgrows the central processor of its computer, it can go to a mainframe computer with small computers as intelligent terminals, downloading appropriate information for distributed processing. He feels that this is preferable to the traditional data-processing management procedure of batch processing, where the mainframe has a host of nonindependent terminals and the whole process requires waiting time.

Ramelot says that actually low- to medium-volume assembly operations demand more computer power than high-volume ones. The high-volume operations can use batch processing

and can wait a day for reports. But when you're trying to move many different assembly operations it gets harder. Cromemco is looking at networking as a possible solution.

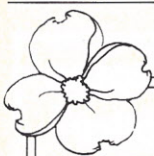
According to Ramelot, the three prime factors in the purchasing decision are lead times (manual input), the MRP cycle (seeing when what is needed), and ABC analysis.

Shunned by orthodox MRP devotees as old hat, ABC divides parts purchasing into A parts, valuable parts important to control; C parts, those with a low-unit value; and B parts, those in between. The A parts get the most attention to get fast throughput, so they will form a minimal drain on capital resources. Expensive peripherals like disk drives get "A" categorization from computer companies.

Cromemco's software also helps management assess buyer performance. You can look at buyers' product in inventory, (especially any excess over a four to six month supply) and how many parts have to get expedited. But the buyer with the worst record could be your best buyer, doing a great job with a tough product area.

On the control side, Ramelot looks to the software to marshal things like inventory turns, cost of money, outstanding commitments at any one time and purchase-order variance. The latter looks for price-change trends that could become significant in a two- to three-month timeframe. At Cromemco, purchasing and its attendant computerization are under the manufacturing department.

Ramelot agrees with Matt Bierek



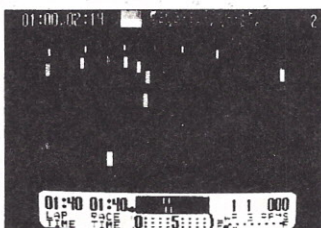
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CIRCLE 86

February 1982/Personal Computing

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BUSINESS COMPUTING

of Videx that the relevance of computerized purchasing ties most directly to size and standardization of inventory. But even if your own function lies far from purchasing, the way of combining judgment to machine logic remains similar, and is worthy of study.

Bill Gleaves, purchasing manager at Cromemco, gives a straightforward motto of purchasing: right place, right time, right price, right quantity. Cromemco doesn't have vendor control automated yet, but Gleaves says this is pretty judgmental—there are not so many factors to juggle. Vendor control will become automated when the next system comes in.

High on Gleaves' current list is purchase-price variance reports, used when the price a buyer authorizes is above or below the standard. Cro-

memco's cost-savings program mandates a standard price to be reviewed whenever a buyer negotiates a better one. He feels the least automatable function is vendor selection. One may have taken some product back three months ago, and another may have the capacity to fill the order, even if his price is a little higher.

Judgment counts

Chuck Wolf, purchasing manager for the Compushop computer-store chain based in Dallas, Texas, stresses the importance of exercising human judgment. He says that knowing what not to automate is as important as what should be automated. He points out that the machine gives an idealistic result which you have to leaven with personal experience. Correct interpretation of data is critical, and ordering on the basis of historical

data alone is a good example of GIGO (Garbage In, Garbage Out).

If this statement seems cautious and discouraging it couldn't be any worse than it was for Bernie Petrocelli when he bought his upscale system and his dealer proceeded to go bankrupt. Petrocelli struggled through the manuals by himself, and had the system up and running in two months.

The positive side of this experience comes from considering the purpose of computerizing purchasing. Ramelot said it one way, Bierek said it another, but both of these businessmen would most likely concur on one fundamental point: If you can indeed marshal, massage and maneuver the data relevant to your task into usable form, you can use the data to anticipate problems, and to control your own business destiny. 

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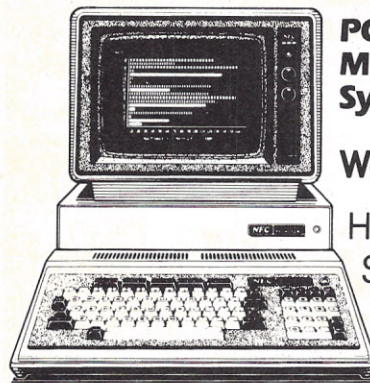
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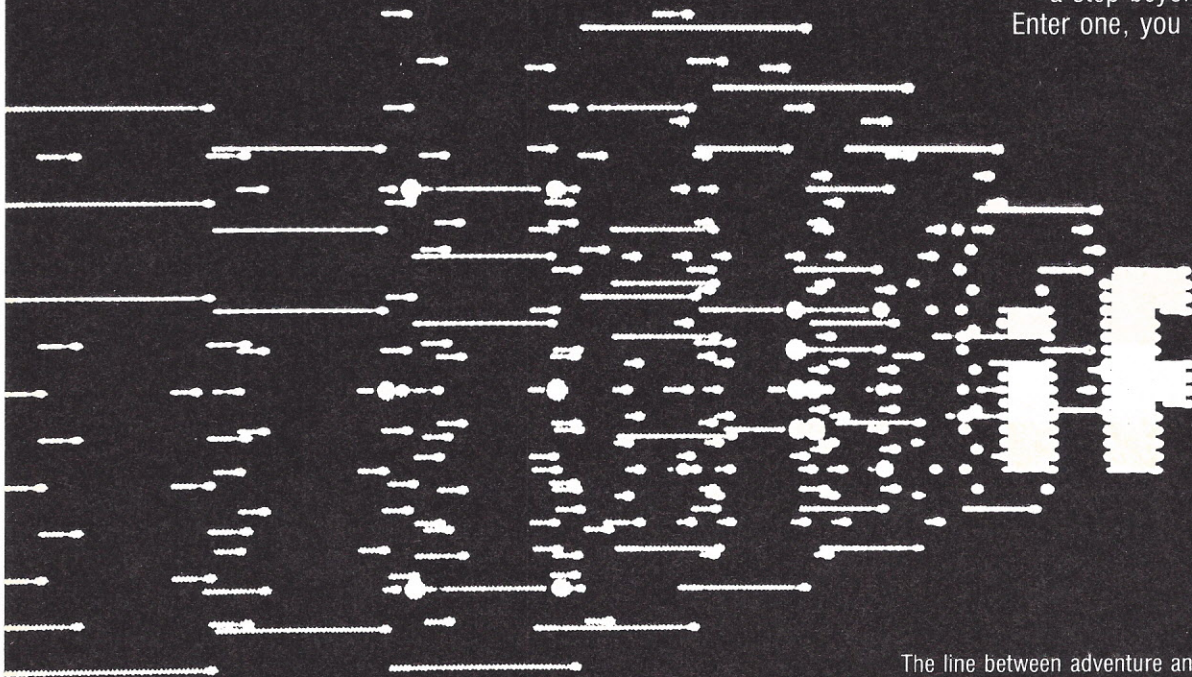
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Cost control

continued from page 24

cash on hand to take advantage of that."

Nye also uses VisiCalc to perform cash-flow analysis, again using forecasted versus actual amounts to find problems in cash flow; and to perform sales levels versus cost analysis, which is a type of break-even analysis that compares costs at different sales levels.

Sales levels versus cost analysis is a kind of "what if" game, and one that shows VisiCalc at its best. By changing the cost of one item, you can determine the sales level necessary to break even.

For example, you have annual sales of \$500,000 and your costs of goods sold is \$325,000. What happens to your net income if your costs increase to \$400,000? What happens

to costs if your sales increase to \$750,000? Using VisiCalc, you can determine the answers to those questions at the touch of a key.

You can play the "what if" game with VisiCalc in many different areas. Russell uses it to perform tax analysis for his clients.

"We offer financial-planning assistance to our clients to help them organize their businesses and their personal finances," he says,

Russell also prepares 12-month budgets and cash-flow sheets for his clients using VisiCalc. "What used to take three days can now be done almost instantaneously," he says. "We can prepare a new budget for our clients in two or three hours."

Another businessman who uses personal computers for cost control is

Chris Aves, president of Petcom Systems. This company performs a personal-computer designing and programming service exclusively for the oil and gas exploration industry.

"We work exclusively for that market because we know the market (His wife, Helena, is president of Helchris Associates, a geological firm) and we feel that the use of computers in the oil and gas industry is different than in the rest of the computer field," he says. "A consulting firm that doesn't know the industry invariably chooses the wrong type of computer system for a company that deals in oil and gas," says Aves, who owns two Apple IIIs and a TRS-80 Model I.

In the oil and gas industry, a large amount of data is necessary to make

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CIRCLE 93

BUSINESS COMPUTING

correct decisions about which wells to drill and which not to drill. "We have a statistical program in which we rank our oil fields," Aves says. "Past production, number of wells, land records, state records and other data are all needed to make a correct decision on which hole to drill. Using a computer and an employee to input the data, a decision can be reached much faster, often in one day instead

of in one month."

Using this information as well as revenue to cost ratios, Helchris is able to consult people in the industry. "This is a risk-reward business," says Aves, who serves as a petroleum consultant for Helchris. "If you have as much instantaneously available information through the use of a computer, you minimize your risks," says Helena Aves.

What is this VisiCalc, anyway?

Many articles in this and other publications mention VisiCalc, which may lead people to wonder just what this program is. It's said that VisiCalc has been a best seller since its introduction, but what does it do?

Usually the answer to that question is simply stated: VisiCalc is an electronic spread sheet. What does this mean?

The best way to think of VisiCalc is to think of its mechanical predecessor — ledger paper. VisiCalc puts ledger paper on the monitor screen. Then a user enters whatever he wishes onto the ledger paper through the keyboard. He simply moves the cursor to the position he wants and enters either a fixed value, a label or a formula in that position.

But VisiCalc is much more. Just as word processing is a quantum leap ahead of mechanical typing, an electronic spread sheet is miles ahead of ledger paper. If the user makes a mistake, it's corrected as easily as making a new entry. No erasing is needed. The format is flexible, so if another column of figures must be added, a few keystrokes accomplish the task. Using ledger paper, one might have to start over if his original format didn't work.

This flexible format is only a small part of VisiCalc's power. The real news comes in its ability to answer the question, "what if?" Just what does that mean?

Think of the number of times you have gone through an elaborate plan—one that involved numerical calculations—and worked the structure through to a conclusion. Upon presenting that result to superiors, you found the work destroyed by the simple question, "What if your assumptions aren't valid?"

With VisiCalc, this need be no cause for alarm. Your assumptions are represented by numbers on the electronic spread sheet. To change the assumptions, simply change the numbers. The program automatically calculates the new results that flow from the change. Many people say this ability to "what if" any kind of problem is VisiCalc's greatest advantage.

In addition to VisiCalc, there are other programs of this type available. Anytime a product enjoys the success of Personal Software's hit package it will soon have a number of competitors including:

- SuperCalc, from Sorcim, located in Santa Clara, Calif.
- T/Maker, from Lifeboat Associates, in New York.
- CalcStar, from Micropro, in San Raphael, Calif.
- Microplan, from Chang Laboratories, in Cupertino, Calif.
- Execuplan, from Vector Graphic, in Westlake Village, Calif.

These programs run on different machines, so anyone thinking of purchasing one should ensure that the one he buys will do the job.

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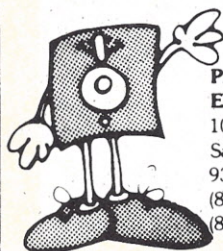
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This is a practical, easy-to-learn program that will work for you — no matter how slow a reader you think you are now. The *Speed Learning Program* is scientifically planned to get you started quickly... to help you in spare minutes a day. It brings you a "teacher-on-cassettes" who guides you, instructs, encourages you, explaining material as you

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Computerland (907) 272-1518
Empire Electronic (206) 244-5200
TV Mart Sales and Service (907) 277-2142

ALABAMA

Anderson Computers (205) 539-3444
Computerland (205) 344-4401
Computerland/Mobile (205) 342-2540
Olensky Brothers (205) 344-7448
University Supply Store (205) 348-6168

ARKANSAS

Computerland/Little Rock (501) 224-4508

ARIZONA

Computerland/Phoenix (602) 956-5727
Computerland/Tempel Mesa (602) 962-6732
Computerland/Tucson (602) 297-7023
The Computer Store (602) 866-0258
Dataplace (602) 266-6111
Desert News (602) 747-0428
Food for Thought (602) 327-9481
Heathkit Electric Center (602) 279-6247
Metro Computer Store (602) 323-3116
Micro Age Computer Store (602) 941-8794
Micro Age Computer Store (602) 790-8959
Personal Computer Place (602) 833-8949

CALIFORNIA

Advanced Computer Prods. (408) 946-7010
Advanced Computer Prods. (714) 558-8813
Apple of Orange (714) 974-3082
A-Vidd Electrs. Co. (213) 598-0444
Berkeley Computer (415) 526-5600
Byte Shop (714) 565-8008
Byte Shop (805) 647-8945
Byte Shop No. 1 (415) 969-5464
Byte Shop/Placentia (714) 524-5380
Byte Shop/Sacramento (916) 961-2983
Central Campbell Computers (408) 370-0199
Computer Age (408) 476-6170
Computer Age (714) 565-4042
Computer Center (415) 845-6366
Computer City (714) 549-7749
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Computer Forum (213) 921-2111
Computerland (213) 371-4624
Computerland (714) 464-5656
Computerland (714) 560-9912
Computerland (805) 928-1919
Computerland (415) 794-9311
Computerland (408) 246-4500
Computerland (408) 267-2182
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Computerland (213) 246-2453
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Computerland/Los Altos (213) 449-3205
Computerland/Pasadena (916) 920-8981
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Computer Merchant (714) 583-3963
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Computer Place (408) 624-7111
Computer Plaza (805) 687-9391
Computer Plus (805) 963-4542
Computer Plus (408) 735-1199
Computer Post (714) 695-2000
Computer Post (408) 244-5300
Computer Post (415) 790-0410
Computers are Fun (213) 475-5476
Computer Scene (707) 462-1578
Computer Shop (805) 963-1325
Computer Sound (805) 945-5921
Computers To-Go (805) 496-2868
Computer Store (213) 451-0713
Computer Store Chula Vista (714) 281-0285
Computer Store/San Leandro (415) 569-4174
Computer World (714) 891-2584
Consumer Computers (714) 465-8888
CTC-The Computer People (714) 565-0505
Dimensional Software (714) 275-4243
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Dow Radio (805) 486-6353
Electric Brain (209) 227-8479
E. T. Research (213) 597-4763
Harding Way News (209) 464-7514
Heathkit Electro Center (213) 749-0261
Heathkit Electro Center (714) 776-9420
Heathkit Electro Center (408) 377-8920
Heathkit Electrs. (415) 236-8870
Henry Radio (213) 820-1234
James Games Computer Center (714) 985-3278
Kepfers' Books (415) 948-5666
Leavitt Distributors (213) 982-2514
Malibu Micro Computing (213) 456-1137

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Micro Age Computer Store (714) 540-3280
Micro Age Computer Store (415) 786-5264
Micro Business World (415) 964-7063
Micro Pacific Computer Ctr. (213) 370-4842
Net Profit Computers (209) 229-0101
O Pamp Technical Books (714) 750-7318
Opsbi Personal Electr. (213) 464-4322
P C Computers (805) 967-7100
Peninsula Computer Ctr. (415) 527-6657
Pomona Valley News Agency (408) 758-9840
Poor Richard's Almanac (714) 591-3885
Printers (408) 425-1991
Rainbow Computing (415) 327-6500
Santa Rosa Computer Ctr. (408) 998-5900
Software Store (213) 349-5560
Stacey's Bookstore (707) 528-6480
Sunset Computers (213) 473-1136
Systems Formulate (415) 421-4687
Technika Berkeley (415) 665-7378
Wenger Computers (415) 281-2621
Zackit Electrs. (415) 524-8934
Zackit Monterey (707) 445-9239
Zackit Vallejo (916) 446-3131
3 E Software Systems (408) 375-3144
(707) 644-6676
(415) 537-3637

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Aparat (303) 741-1778
Colorado Computer Sys. (303) 426-5880
Computer Connection (303) 449-8282
Computer Connection (303) 449-8282
Computerland (303) 574-4170
Computerland/Denver (303) 759-4685
Computer Technology (303) 427-4438
Computer Works (303) 449-6233
Micro Computer Mgmt. (303) 493-5700

CONNECTICUT

AM Computer Prods. (203) 621-2331
Aetna Life Club Store (203) 273-3058
Computer City (203) 521-2245
Computer City (203) 562-7546
Computerland (203) 235-9204
Computerland/New Haven (203) 273-4807
Computer Store (203) 563-9000
Computer Store (203) 356-1920
Computer Store (203) 627-0188
Computer Works (203) 255-9096
Diversified Electrs. (203) 397-2607
Exel Sys. (203) 348-5894
Harold's Drugs (203) 583-1854
Micro Age Computer Ctr. (203) 846-0851
Technology Sys. (203) 748-6856

DELAWARE

Computerland (304) 624-6409
Computerland/New Castle (302) 738-9656
Micro Age Computer Store (302) 998-7340

DISTRICT OF COLUMBIA

Computer Store (202) 272-0294
Pentagon Book Stores (202) 695-0870
Program Store (202) 337-4693
Students Book Co. (202) 223-3327

FLORIDA

A I Personal Computer (305) 339-8914
Byte Shop of Miami (305) 264-2983
Clarks Out of Town News (305) 467-1543
Computer Ctr./Palm Beach (305) 689-3233
Computerland (305) 862-6202
Computerland (904) 224-9341
Computerland (813) 971-1680
Computerland (904) 731-2471
Computerland/Boca Raton (305) 368-1122
Computerland/Ft. Lauderdale (305) 566-0776
Computerland/W. Palm Beach (305) 684-3338
Computer Scene (305) 945-1014
Computer Shack (904) 396-1800
Computer Store/Gulf Breeze (904) 932-0660
Computer Sys. Resource (904) 376-4276
Data Processing Computer Store (305) 894-8351
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Goerlings Book Ctr. (904) 378-0363
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Heathkit Electrs. Ctr. (813) 886-2541
Henry's News Stand (813) 536-3863
H.I.S. Computerization (305) 254-9399
Lighthouse Book Store (305) 781-1945
Micro Computer System Inc. (813) 879-4301
Poling Place (813) 541-2729
West Indies Electr. (305) 556-1300
Williams Radio and TV (904) 354-5460

GEORGIA

Atlanta Computer Mart (404) 455-0647
Baileys Computer Shop (404) 790-5771
Computerland/Atlanta (404) 953-0406
Electronics 21 Inc. (912) 352-0585
Guld News Agency (404) 252-4166

HAWAII

Amtec Inc. (808) 955-7429
Computer Center (808) 448-2171
Computerland/Hawaii (808) 521-8002
Data 1 Microcomputer (808) 946-1733
Radio Shack No. 7086 (808) 487-1509
Univ. of Hawaii Bookstore (808) 948-8022

IOWA

Business Data Processing (515) 276-8858
Memory Bank (319) 386-3330

IDAHO

Computer Co. Inc. (208) 375-9381
Northwest Computer Ctr. (208) 375-6681

ILLINOIS

ABC Byte Shop (312) 673-3550
Alpine Computer Ctr. (815) 229-0200
Book Market (312) 944 3358
Book Market (312) 440-4475
Byte Shop (312) 579-0920
Byte Shop (217) 352-2323
Chicago Main Newstand (312) 864-2727
Compushop (312) 593-1800
Computer-Ease (309) 833-3886
Computerland (312) 949-1300
Computerland (312) 967-1714
Computerland/Champaign (217) 359-0895
Computerland/Northbrook (312) 272-4703
Computerland/Schaumburg (312) 253-3009
Computer Store/Rockford (815) 962-7580
Data Domain/Schaumburg (312) 397-8700
Digitalworld (312) 628-9222
Kroch's & Brentano's (312) 332-7500
Micro Computer Ctr./Geneva (312) 232-1545
Nabih's Inc. (312) 869-6140
Northbrook Computers (312) 480-9190
Oak Brook Computer Ctr. (312) 941-9005
Prairie News Agency (312) 883-1141
The Book Store (312) 255-8040
Univ. Bookstore (618) 536-3321
Videomart Inc. (312) 861-1255
Wallace Micro-Mart Inc. (309) 685-7876
Wine Micro Computers (312) 420-8813

INDIANA

Acro Electronics (219) 397-8681
Computerland (219) 256-5688
Computerland (219) 483-8107
Computerland/Anderson (317) 649-1122
Computer Plus (219) 865-3930
Computer Room (219) 277-1515
Computer Store (317) 662-9994
Data Base (219) 484-3164
Data Domain (812) 334-3607
Graham Electrs. (317) 634-8202
Heathkit Electr. Ctrs. (317) 257-4321
Hoosier Electrs. (812) 232-8508

KANSAS

Amateur Radio Equip. (316) 264-9166
Book Nook (913) no listing
Computerland (913) 492-8882
Computerland Hutchinson (316) 662-6832
Computerland/Topeka (913) 267-6530
High Technology/Wichita (316) 262-0315
Micro Age Computer Store (913) 823-7596
Online Computer Centers (913) 341-6651
Personal Computer Ctr. (913) 649-5942

KENTUCKY

Computer Emporium (502) 589-9482
Computer Place (606) 276-3594
Heathkit Electr. (502) 245-7811

LOUISIANA

Computer Shoppe Inc. (504) 454-6600

MASSACHUSETTS

Computer City (617) 755-5464
Computer City (617) 875-8126
Computer City (617) 273-3146
Computer City (617) 242-3350
Computer City (617) 826-9217
Computer City (617) 774-7118
Computerland/Boston (617) 235-6652
Computerland/Boston (617) 482-6033
Computer Source (413) 443-7181
Computer Store (617) 232-5470
Computer Store (617) 354-4599
Harvest Computer (617) 547-3289
Heathkit (617) 531-9332
Heathkit Electrs. (617) 237-1510
Out of Town News (617) 354-7777
Palace Spa (617) 783-5858
Retail Computer Ctr. (413) 589-0106
Small Computer Data Sys. (413) 592-6600
Small Business Group (617) 692-3800
Video Station (617) 933-1445
YDI Electrs. (617) 449-1005

MAINE

Home Port Computers (207) 873-2192

MARYLAND

Bethesda Computers (301) 657-1992
Chafitz (301) 340-3300
Computer Crossroads (301) 730-5513
Computers Etc. (301) 268-5801
Computers Etc. (301) 268-5801
Computers Etc. (301) 296-0520
Computerland (301) 340-8484
Computerland/Towson (301) 337-5555
Computer Unlimited (301) 321-1553
Heathkit Electrs. (301) 881-5420
Logical Choice (301) 465-3175
Micro Age (301) 762-7585
Muse Computer Ctr. (301) 659-7212
Personalized Computer Consul. (301) 840-0412
Program Store/Baltimore (301) 944-0200
Radio Shack (301) 224-2900
The Comm. Center (301) 792-0600

MICHIGAN

Community News (517) 321-8797

Community News Center	(313) 662-6150	Computer Store	(212) 832-2180	Computerland	(605) 338-5263
Community Newscenter	(517) 694-0490	Computer Store	(914) 428-1661	Computerland/Rapid City	(605) 348-5384
Community Newscenter	(517) 349-3510	Computer Store-Rochester	(716) 244-5000	TENNESSEE	
Computer Center	(313) 422-2570	Computer Tree	(607) 748-1223	Chatanooga Computer Ctr.	(615) 892-7038
Computer Connection	(313) 447-4470	Comtek/Brooklyn	(212) 332-5933	Computer Lab	(901) 761-4743
Computer Horizons	(313) 464-6502	Comtek/Staten Island	(212) 698-7050	Computerland	(615) 246-6173
Computerland/Grand Rapids	(616) 942-9231	Data Scan Comp. Sys.	(516) 698-6285	Computerland/Knoxville	(616) 693-8225
Computerland/Southfield	(313) 356-8111	Datel Sys.	(212) 921-0110	Computerland/Memphis	(901) 767-0233
Computer Mart	(313) 288-0040	Future Distribution	(518) 561-5703	Eastern Micro Computer	(615) 594-8365
Computer Mart/Flint	(313) 234-0161	Future Visions Computer	(516) 423-7820	Tobacco Corner	(901) 682-3326
Computer Mart/Lansing	(517) 351-1777	Harcourt Brace Bookstore	(212) 888-3333	TEXAS	
Front Page Bookstore	(313) 332-3431	Harrison Radio	(516) 293-7990	Agriplex Computers	(806) 797-4495
Heathkit Electr.	(313) 772-0416	Heathkit	(914) 761-7690	Axiom Business Computers	(214) 279-1505
Heathkit Electr. Ctr.	(313) 535-6480	Heathkit Electrs.	(516) 334-8181	Centurion Computers	(817) 778-9105
Level 4 Products	(313) 525-6200	Heathkit Electrs.	(716) 835-3090	City Electr. Supply	(713) 621-1060
Metro News 1	(313) 759-0230	Home Computer Ctr.	(716) 244-6237	Compshop	(214) 234-3412
Micro Computer World	(616) 451-8348	L.I. Computer Store	(516) 887-1500	Compshop	(713) 893-2060
NCE/Compumart	(617) 491-2700	Magazine Emporium	(212) 864-0500	Computer Center/Houston	(713) 527-8008
New Horizons Book Shop	(313) 296-1560	Majority New Dist.	(212) 243-7770	Computercraft	(713) 977-0664
Rainbow Computing	(313) 528-3535	Micro Age Computer Store	(716) 244-9000	Computerland	(214) 363-2223
Rochester Book Center	(313) 651-0199	Mr. Computer	(914) 297-1223	Computerland	(512) 724-1551
Simtec	(313) 855-3990	Papyrus Books	(212) 864-8862	Computerland/Austin	(512) 452-5701
Spectrum Computers	(313) 559-5252	Programs Unlimited	(516) 997-8668	Computerland/El Paso	(915) 533-6060
MINNESOTA		Programs Unlimited	(914) 761-9283	Computerland/Houston Bay	(713) 488-8153
ABS Computer	(612) 253-8734	Spartan Electrs	(516) 499-9500	Computerland/Tyler	(214) 581-7000
Compudata	(218) 722-6319	Super Business Machines	(212) 964-6666	Computerland/Westwood	(713) 270-1200
Computer Depot	(612) 375-2008	Syosset Video & Electrs.	(516) 921-5454	Computer 'N' Things	(512) 453-5970
Computerland	(612) 559-1984	NORTH CAROLINA		Computer Port	(817) 469-1502
Digital Den	(612) 699-8442	Book Nook	(919) 725-3696	Computer Pro	(817) 654-3360
Granada News	(218) 727-9122	Byte Shop	(704) 568-8100	Computer Shop	(512) 828-0553
Heathkit Ctr.	(612) 938-6371	Computer Alternatives	(704) 274-5404	Computer Solutions	(512) 341-8851
Micro Age Computer Store	(612) 338-1777	Computerroom	(704) 377-9821	Computer Tech Assoc.	(915) 533-2108
Minnesota Book Center	(612) 373-5734	K & S Newstand	(919) 724-7537	Computer Technique	(713) 947-9633
Readmore Bookstore	(612) 333-3628	Liberty News & Beverage	(919) 493-1180	Computer To-Go	(512) 472-8926
Readmore Book & Card	(507) 345-5704	Worldwide News & Specialties	(919) 467-7130	Computer Video Sys.	(214) 423-3654
Schindler's Hennepin News	(612) 333-6942	NORTH DAKOTA		Expensive Toys/Big Boys	(512) 340-5600
Shinder Book & News	(612) 227-0899	Computerland/Fargo	(701) 237-3069	Heathkit	(512) 341-8876
MISSOURI		Computerland/Grand Forks	(701) 746-0491	Heathkit Electrs. Ctr.	(214) 826-4053
Computer Country-North	(314) 921-5644	OHIO		Lone Star News	(713) 772-9007
Computer Mart/Springfield	(417) 862-6500	All Media Material	(216) 678-5499	Micro Age Computer Store	(602) 894-9247
Gateway Electrs	(314) 427-6116	American Bookstore, New Parma	(216) 888-8210	Micro Age Computer Store	(915) 544-7145
House of Computers	(417) 782-0880	Basic Computer Shop	(216) 867-0808	Micro Age Computer Store	(713) 270-9647
Micro-Age Computer Ctr.	(314) 567-7644	Cincinnati Computer Store	(513) 671-6440	Micro Age Computer Store	(713) 440-7547
MONTANA		Computer Connection	(419) 222-6464	Micro Computer Shoppe	(512) 855-4516
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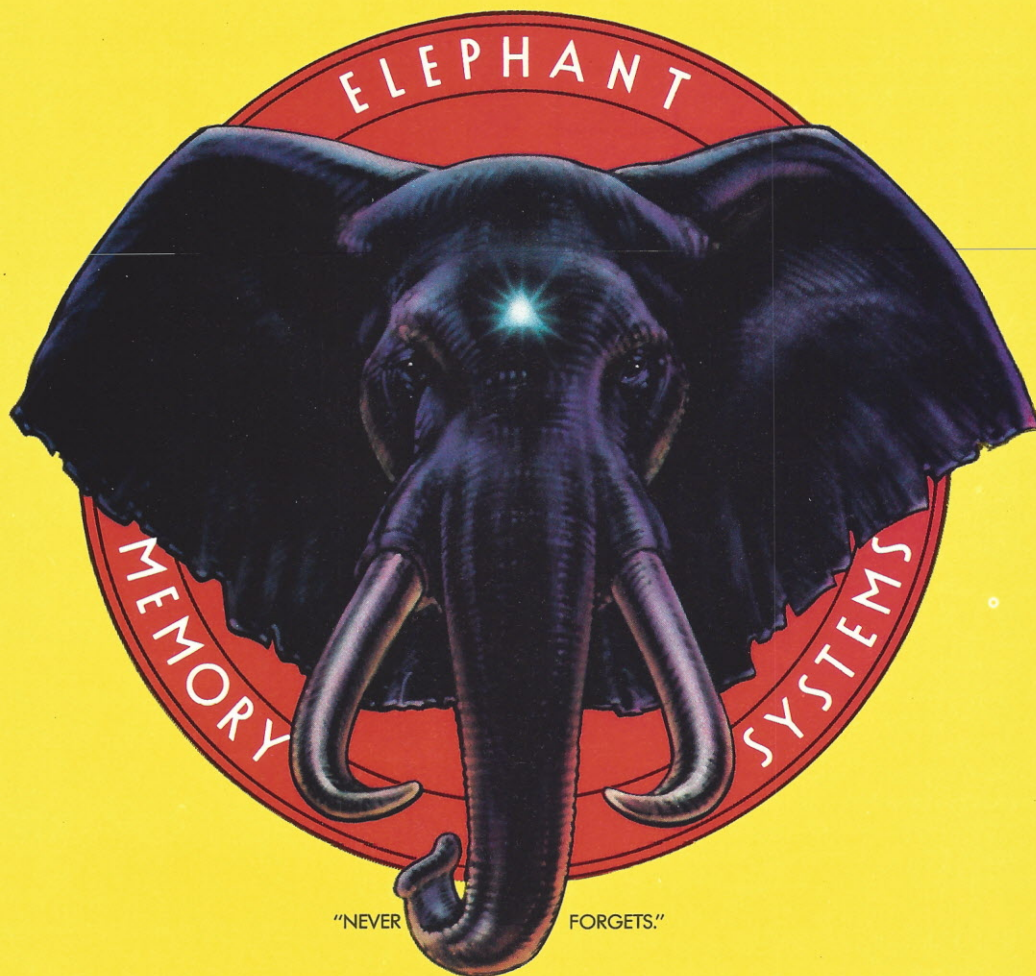
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